The Princes Of Phisicke: References to authorities in medieval and early modern English medical writing

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Länsi-Eurooppalainen lääketiede ja lääketieteelliset tekstit muuttuivat dramaattisesti, kun uuden ajan empirismi korvasi asteittain keskiaikaisen lääketieteen traditiot. Siinä missä keskiaikainen lääketieteellinen tutkimus perustui varsinkin kreikkalaisten ja arabialaisten auktoriteettien kirjoituksiin, uuden ajan empiristinen lähestymistapa korosti aistihavaintojen ja matemaattisten metodien tärkeyttä. Tutkielmani aiheena ovat viittaukset auktoriteetteihin keskiaikaisissa ja uuden ajan lääketieteellisissä teksteissä. Tutkimalla, miten viittaukset muuttuivat vuosien 1375-1600 välillä, pyrin selvittämään ideologisten muutosten vaikutuksia englanninkielisten lääketieteellisten tekstien tyyliin.

Tutkimukseni teoreettisen viitekehyksen muodostavat historiallinen pragmatiikka ja diskurssianalyysi. Historiallisessa pragmatiikassa kirjalliset lähteen nähdään puhutun kielen kaltaisina kommunikatiivisina tilanteina, joihin vaikuttavat muun muassa niiden ajallinen konteksti, kirjoittajien tavoitteet sekä niiden lukijakunta. Historiallinen diskurssianalyysi liittyy läheisesti historialliseen pragmatiikkaan, ja sen tavoitteena on tutkia, miten eri kielelliset yhteisöt käyttävät ja muodostavat diskursseja sekä millaisia kommunikatiivisia funktioita kielellä on eri diskursseissa.

Analysoin viittauksia auktoriteetteihin käyttämällä korpuslingvistiikan tilastollisia metodeja yhdistettynä yksityiskohtaiseen kvalitatiiviseen tutkimukseen. Tutkimus perustuu materiaaliin kahdesta korpuksesta: *Medieval Medical Texts* (1375-1500) ja *Early Modern Medical Texts*. Yhdessä nämä korpukset sisältävät lääketieteellisiä tekstejä kolmelta vuosisadalta, minkä vuoksi niiden avulla on mahdollista tutkia, miten lääketieteellinen kirjoittaminen muuttui 1300-luvun ja 1600-luvun välillä.

Tutkimukseni tulosten mukaan keskiaikaisten tekstien viittaukset ovat sävyltään lähes kokonaan myönteisiä, kun taas uudella ajalla tekstien välillä on enemmän variaatioita. Kriittiset viittaukset lisääntyivät hieman 1600-luvulla, mutta kaiken kaikkiaan viittaukset auktoriteetteihin vähenivät merkittävästi vuoden 1599 jälkeen. Viittaukset oppineissa teksteissä ja teoreettisissa keskusteluissa sisältävät tarkempia lähdetietoja kuin yleiset keskustelut ja laajemmalle yleisölle suunnatut tekstit. Lähdetietojen antaminen kuitenkin väheni merkittävästi 1600-luvun aikana.

Avainsanat: korpuslingvistiikka, historiallinen kielitiede, tieteellinen kirjoittaminen

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1. Introduction

Science and medicine underwent major changes between the 14th and the 17th century, and as the scientific basis of medicine changed, medical writing changed with it. The writers of medical texts adapted their style to meet the needs of the changing medical community, and as old traditions waned new styles emerged to replace them. The topic of my MA thesis is the use of references, which was a specific feature of medieval medical writing (Taavitsainen 2012:108; see 2.1. below), and I am specifically studying references to authorities who were essential in the medieval period but whose importance began to decline from the latter half of 16th century onwards. Through this focus I hope to gain insight into how changes in ideologies can affect the style of scientific writing. The quote in the title of this thesis comes from Thomas Gale's surgical treatise *Institution of a Chirurgian* (1563)[1].

My study of references is based on a corpus linguistic examination of three authorities: Avicenna, Hippocrates, and Galen (section 5.2. below), and I investigate the communicative function of these references within the theoretical framework of historical pragmatics and discourse analysis (section 4 below). The corpora I use in my study are the corpus of *Medieval Medical Texts* (MEMT) and the corpus of *Early Modern English Medical Texts* (EMEMT). Together they cover three centuries of English medical writing, from the late medieval period to the end of the 17th century. Both corpora have been divided into categories which represent different traditions of medical writing.

Previous studies on references show that the use of references varied according to the different branches of medical writing (Taavitsainen and Pahta 1998:181), and that overall their frequency dropped during the early modern period (Taavitsainen 2009:44; section 3.3. below). According Taavitsainen and Pahta (1998:167-168) in the late medieval period and early 16th century references to authorities were a prominent feature of learned medical writing. During the early

[1] "Truth it is, and in the begynnynge phisicke and Chirurgery ware both one: & one man exercised both, for so did the princes of phisicke Hippocrates and Galene" (Gale 1563).

modern period, however, references became more frequent in popular medical texts aimed at a wider audience than learned texts (Taavitsainen 2009:50). The aim of this study is to examine references to authorities in further detail by analysing them according to their tone and how specific they are. My research questions are:

1. How did the use of references change over time?
2. How different categories of medical writing differ from each other in terms of tone and specificity?
3. What were the possible motivations for making specific references?

Based on the previous studies it seems likely that medieval medical writing was more conservative in the use of references than early modern texts, and that the majority of the changes took place towards the end of the early modern period. Therefore is it possible that references to authorities became increasingly critical in their tone during the course of the 17th century, while references in earlier texts are mostly affirming.

2. Medicine in medieval and early modern England

2.1. Medicine in the Middle Ages (1300-1500)

During the medieval period economic growth made Western Europe gradually more urbanised (French 2003:65; Siraisi 1990:13) and as the population and the wealth of the cities increased schools and other centres of education grew larger as well, and by the end of 12th century the first universities had been established (French 2003:65; Siraisi 1990:15). According to French (2003:65) the growing wealth of the West encouraged trade and cultural exchange between Western Europe and the Eastern Roman Empire, which gave the West better access to Greek texts on science and medicine. In the early medieval period the Greek sources available in Latin, which was the language of the western scientific community, were limited to compilations that gave only a general view of Greek medical knowledge (Siraisi 1990:6). However, from the late 11th century onwards an

increasing number of Greek texts were translated into Latin mostly from Arabic sources, and the texts translated were also increasingly more theoretically advanced (Siraisi 1990:14-15). As noted by Siraisi (1990:15), Greek and Arabic sources of knowledge fundamentally changed the Western European scientific community. By the late medieval period (1300-1500) ancient Greek authorities were the established foundation of learned medicine taught by the universities (Siraisi 1990:13). Although learned medicine did not replace lay practitioners or folk medicine completely, the establishment of universities made medicine increasingly professional and specialised during the medieval period (*ibid*.)

Although the education of medical practitioners also included practical skills and work experience, university education focused first and foremost on familiarising the students with the works of the main authorities in their field (Siraisi 1990:73), the most important of which in the case of medicine were Hippocrates and Galen (Siraisi 1990:15-16). The study of medicine was based on the scholastic method, which meant analysing the texts of authorities, disputing problems, and discussing conflicting ideas (Siraisi 1990:73, 76). Siraisi argues that this method had its benefits as well as its downsides when it was applied to medicine:

> It [the scholastic method] fostered critical comparison of statements in supposedly authoritative texts (even though the goal was usually reconciliation) and developed habits of rational analysis. But it also encouraged excessive expenditure of ingenuity in elaborating intricate arguments about textual interpretation; and it focused attention on issues to which observation was largely irrelevant. (1990:76)

In addition to textual analysis of authoritative texts, emphasising continuity was also an essential part of scholastic medicine, and the university-educated physicians saw themselves as part of a tradition reaching all the way back to Hippocrates and Galen (French 2003:87). According to French (2003:112) referring to ancient sources gave medicine credibility as a discipline because the wisdom of the ancient Greeks was widely accepted and respected in the medieval scientific community. The medical theory based on the teachings of the ancients did not however always match physicians' experience of actual medical practice (Siraisi 1990:137). Although university-educated physicians were aware of these problems and did discuss them openly (*ibid*.), challenging

the medical theory was uncommon, and most preferred to stretch the existing definitions to include previously unknown phenomena rather than claim they were missing from the works of the authorities completely (Siraisi 1990:128).

The most important authorities of the scholastic tradition were Hippocrates and Galen, who were seen as the founders of medicine (French 2003:73). Although the actual origins of the Hippocratic texts are uncertain (French 2003:9), the aphorisms attributed to him were the earliest medical writings available and therefore he was thought of as the original authority on whose work the rest of medical knowledge was built on (French 2003:10-11). According to French (2003:109-110) Hippocrates' aphorisms were especially appealing to medieval scholastic physicians because of their short and authoritative form, which meant they could be used as the axioms of medical knowledge. The aphorisms could, however, be cryptic in their brevity and they needed to be explained (French 2003:49). Galen, who saw himself as a follower of Hippocrates (French 2003:37-38), based his medicine on Hippocrates' work and wrote an extensive commentary on the aphorisms (French 2003:48). In the Middle Ages this commentary was the starting point of understanding and reconstructing Hippocratic medicine, which was scholastic medicine's ultimate goal (French 2003:109; Siraisi 1990:4). Galen was a very productive writer and besides the commentary on the Hippocratic texts he wrote several original works as well (French 2003:47-48). Galen's body of texts was of huge importance to medieval medicine, and until Andreas Vesalius's work in the 16th century Galen's heritage was the main source of anatomical knowledge in Western Europe (Siraisi 1990:4).

In the rhetoric of learned scholastic practitioners medicine had reached a high point with Galen and his writings completed the tradition that had started with Hippocrates (French 2003:107). In practice, however, references to medieval Arabic writers were frequent as well, and according to French Avicenna's *Canon* was "effectively the medical man's Bible" (2003:100). The *Canon* covered both anatomical and general medical knowledge, and introduced a large number of

diseases, remedies, and complexions in a systematic manner (French 2001:100). Most of the ancient Greek medical texts available in Western Europe came from Arabic sources, and although it was not explicitly part of the rhetoric of the learned tradition, original material from Arabic scholars was also important to the western medical community (French 2003:63). Arabic physicians had access to most texts earlier than their Latin speaking colleagues, and the medical theory of Hippocrates and Galen was well known in the Arabic medical community already by the 9th century (Siraisi 1990:11-12). Arabic medical writers also added their own observations to the Greek works, and especially botanical knowledge was developed further in their writings (*ibid*).

Although learned medicine was based on the medical knowledge of the ancient Greeks, according to Siraisi scholastic medicine was not simply a matter of passive reception of knowledge, but learned physicians played an active role in selecting and editing texts for specific purposes (1990:187-188). As the most advanced medical texts available, ancient Greek and medieval Arabic works were the foundation of university education, and these texts were specifically edited to suit the classroom environment (French 2003:62; Siraisi 1990:50, 70-71). Because the students had to be taught a lot in a fairly short amount of time, university curricula tended to focus on material that was concise, highly structured, and axiomatic (French 2003:61-62). Students learned medicine through abbreviated Latin translations of the original texts as well as through commentaries specifically written for teaching purposes (*ibid*.). Encyclopaedias written by Arabic medical authorities were also read widely and had an essential role in western medical education (Siraisi 1990:11-12).

Although only a very small number of all medical practitioners were university-educated (French 2003:126; Siraisi 1990:31), their distinguished education made them influential and gave them status over other members of the medieval medical community (Siraisi 1990:20). The learned physicians formed a medical elite that enjoyed the institutional support of the universities (Siraisi 1990:20), and they dictated what constituted as medical knowledge (French

2003:121). According to Siraisi (1990:20) by the early 14th century an unofficial hierarchy had been established where university-educated physicians were at the top, followed by learned surgeons and other skilled practitioners, while barber-surgeons, herbalists, apothecaries, and lay practitioners were the least prestigious. The measure of learnedness was Latin literacy (Siraisi 1990:20) and having access to the Latin translations of Greek and Arabic medical texts gave the learned physicians a superior status that was difficult for other practitioners to challenge (French 2003:102). Literacy was also what set apart learned surgeons from other craftsmen practicing surgery (Siraisi 1990:177). However, the basic concepts and techniques of learned medicine were disseminated throughout the medical community through vernacular medical texts (Siraisi 1990:20-23, 48). Therefore although medical practitioners came from widely different backgrounds and differed in their social status, there was a common medical culture which the practitioners shared in varying degrees, raging from the university-educated physicians to illiterate empirics (*ibid*.)

According to French (2003:125) the hierarchy of the medical community was not as rigid as the learned medical practitioners would have preferred it to be, and the learned practitioners were always under pressure to defend their branch of medicine (French 2003:126). Lay people could be distrustful of the university-educated practitioners (French 2003:119), and for most village healers and local midwives were the main providers of medical care (Siraisi 1990:27, 35). The awareness of possible competition encouraged those literate in Latin to emphasise their learnedness and the superiority of their medical knowledge (Siraisi 1990:35). Latin literacy was not, however, completely restricted to universities (French 2003:125; Siraisi 1990:50), and by the late 14th century a notable number of medical handbooks were available in English as well as in Latin, which created a community of practitioners who were not university-educated but literate in the vernacular (Siraisi 1990:20). These practitioners could offer medical care similar to the university-educated physicians' practice (Siraisi 1990:34, 52), and lay and professional medicine were often based on the same Greek heritage (Siraisi 1990:187).

2.2. Early modern medicine (1500 – 1700)

From the beginning of the 16th century to the end of the 17th there was a gradual but notable change in the English scientific community. The scholastic method of medieval science was challenged by the empirical philosophy of scientists such as Robert Boyle and Isaac Newton (Wear 2000:260-261, 354), and traditional learned medicine was transformed by the anatomical work of Andreas Vesalius and William Harvey (Mikkeli & Marttila 2010:13-14; Porter 2004:51-52; Wear 2000:242). Although traditional ways of thinking persisted as well, especially before the latter half of the 17th century (Wear 2000:32, 97), various sociocultural changes re-shaped the medical community in the early modern period and influenced English medical writers' attitudes towards the authority of ancient Greek and Arabic authorities.

The early modern period inherited the hierarchical structure of the medieval medical community and therefore surgeons trained through practical apprenticeship were seen as subordinate to university-educated physicians (Mikkeli & Marttila 2010:22; Porter 1987:18-19; Wear 2000:26, 217). Learned physicians' superiority was based on their formal education and their ability to read Latin and, to a lesser extent, Greek (Wear 2000:61, 217). Surgery was also primarily seen as a craft, while university-educated physicians' medicine was a science, which gave them a higher status in the medical community and the exclusive right to administer internal medicine (Mikkeli & Marttila 2010:22; Porter 1987:18; Wear 2000:61, 217). The early modern community was also shaped by the establishments of medical guilds (Wear 2000:25). The London College of Physicians was founded in 1518, and during the early modern period other practitioners founded their own guilds as well, including barber-surgeons and apothecaries (Wear 2000:25-26). Barber-surgeons and apothecaries were trained within the guilds through apprenticeship, and after finishing their training and examination they became full-fledged members (Wear 2000:26-27). The College of Physicians were granted the authority to license physicians in England in 1523, but their

influence was practically restricted to London, and their ability to regulate practitioners weakened especially during the 17th century (Wear 2000:27). However, guilds were influential when it came to educating their members (Wear 2000:36; 230-231). For example, the Company of Barber-Surgeons established a more systematic approach to surgical training, and both the apprentices and the members were expected to attend lectures (Wear 2000:230). Whereas surgeons mostly learned their craft from vernacular books (Wear 2000:231), the College of Physicians required its members to be literate in Latin (Wear 2000:36).

Although the surgeons took pride in their craft and their practical skills (Wear 2000:214), they were anxious to establish a learned branch of surgery (Wear 2000:218). In fact, university-educated physicians also advocated giving surgeons a more classical education to differentiate surgery from lay medicine, but they still wished to keep it subordinate to their practice, as noted by Wear:

> The surgeon in the view of the learned physician was a paradoxical creature, someone who had taken over part of the physician's job, who should be educated, yet limited in what he could do, and under the physicians orders. (2000:219)

The surgeons on the other hand advocated uniting surgery and the rest of medicine, which might have been partially motivated by wanting to share in on the higher social status of learned physicians, but at least some also believed this could improve both surgical and medical practices (Wear 2000:212, 220, 227). Therefore early modern writers of surgical texts had a tendency to emphasise the learnedness of surgery, which lead them to stress its antiquity and its links to learned medicine and classical knowledge (Wear 2000:221-222).

Medicine practiced by lay people with no professional training or formal education also thrived throughout the early modern period, and for most people it was the only realistic option available (Wear 2000:21, 25). Although some gave medical care to the poor free of charge as a form of Christian charity (Porter 1987:22), the services of a university-educated physician were expensive and the numbers of formally educated physicians were low especially in rural areas (Mikkeli & Marttila 2010:21-22; Porter 1987:14, 18, 20). Lay medical practitioners were often

women, and as in the Middle Ages for many old wives, herb women, and midwives continued to be the only providers of health care (Porter 1987:20-21; Wear 2000:22, 49-50). In the early modern period medicine was also seen as one aspect of female household skills, and women prepared remedies in their kitchens out of the herbs they grew in their own gardens (Wear 2000:49-50, 55). It was also an educated woman's duty to instruct their daughters and servants in preparing remedies (Wear 2000:50-51). In addition to medicine practiced at home, there were lay practitioners who made a living out of their remedies, and when people fell ill there was a range of different practitioners they could consult (Mikkeli & Marttila 2010:27; Porter 1987:21; Wear 2000:22).

In a word, lay medicine was increasingly in competition with learned medicine in the early modern period (Wear 2000:50). People would often try self-medicating first and sought learned medical advice as a last resort, if even then (Porter 1987:29-31; Wear 2000:21). To protect their position, learned physicians tried to regulate lay medical practices through legal actions, institutions and licensing (Mikkeli & Marttila 2010:23, 25; Porter 2000:18). To set themselves apart from other branches of medicine, learned practitioners emphasised their own learnedness and classical education by, for instance, using the Latin or Greek names for plants (Wear 2000:58), or by making references to authorities (Taavitsainen 2010:35).

During the early modern period traditional scholastic medicine was also challenged by other branches of learned medicine. Medical chemistry, defined by the German physician and alchemist Paracelsus in the early 16th century and later by the Flemish chemist van Helmont, was advocated as a better alternative to Greek medicine (Mikkeli & Marttila 2000:23.24; Wear 2000:39). The followers of Paracelsus and van Helmont criticised traditional medicine for purgative procedures such as bloodletting which they argued to be ineffective and cruel (Wear 2000:353). The medicine of classically university-educated physicians also did not fit well within the framework of the new natural philosophy which aimed to replace authoritative books as the basis of scientific knowledge with observation and empiricism (Mikkeli & Marttila 2010:26-27; Wear 2000:98). The

criticism was directed especially towards Galen because some saw Hippocrates as the first empiricist who had reported true observations, while Galen's approach had stagnated medical progress and made it inflexible (Wear 2000:76, 374). There was also debate over whether or not the medicine of ancient authorities was universally applicable, as it had been created in classical times for a specific geographical area which had a very different climate from early modern England (Wear 2000:76-77).

In the early modern period the attitude of the scientific community towards traditional medicine was also influenced by the cultural impact of certain epidemic diseases, especially the pox and the bubonic plague. These diseases challenged medical practitioners and the theoretical basis of their medicine. The pox seemed to be a new disease that had been unknown to the ancients, which undermined the idea that all medical knowledge could be found in their writings (Mikkeli & Marttila 2010:14; Wear 2000:260). The bubonic plague had an even bigger impact on the early modern society because of its fatality (Wear 2000:277). The reoccurring plague outbreaks throughout the period were a challenge to medical practitioners and their methods, the apparent ineffectiveness of which fuelled the scepticism towards traditional learned medicine (Porter 1987:14; Wear 2000:277). The plague began to be discussed in the terms of the new natural philosophy, and its chemical terminology was used to describe the possible causes of the disease, which was clearly a step away from traditional learned medicine (Wear 2000:305-306). Traditional Galenic explanations for the plague persisted especially among lay people, and the critics of scholastic medicine used that to make connections between supporters of classical medicine and ignorant common people (Wear 2000:306-307).

Traditional scholastic medicine and the institutions built around it had lost the unquestionable authority they had previously held in England by the end of the 17th century (Wear 2000:358) and all traditional medical practices came under the scrutiny of the advocators of the new empirical natural philosophy (Wear 2000:386). What should replace traditional medical practices

was debatable and there was competition between different new medical theories (Wear 2000:260), but they shared common ground when it came to leaving scholastic medicine behind, as explained by Wear:

> There was agreement as to what the new science should not be: Aristotelian natural philosophy and the power of past authorities and old books to determine what knowledge was had to be replaced. (2000:260)

Even though the everyday practice of medicine did not necessarily change considerably (Wear 2000:434), the theoretical basis of scientific knowledge had shifted by the end of the early modern period from ancient and medieval authorities and their writings to observation, eyewitness accounts and the scientific method (Mikkeli & Marttila 2010:26-27; Wear 2000:365). Late 17th century scientific community was particularly shaped by the establishment of the *Royal Society of London for Improving Natural knowledge* in 1660. Known simply as The Royal Society, it came to be largely under Newton's influence (Wear 2000:262) and it advocated scientific empiricism and mathematical, measurable methods (Mikkeli & Marttila 2010:27; Wear 2000:358). Whereas in the 16th and early 17th century the study of medicine still consisted mainly of examining ancient texts and making educated decisions about which texts were the most valuable (Wear 2000:97), within the 17th century observation largely replaced tradition as the source of medical knowledge (Wear 2000:358).

3. History of English medical writing

3.1. Middle English medical texts (1300-1500)

The history of English medical writing goes back to the Old English period, when practical texts such as remedy books and medical advice written in verse were available in the vernacular (Siraisi 1990:52; Taavitsainen 2010:33). More theoretically complex texts, however, were sparse until the vernacularisation of medical texts in the late medieval period (*ibid.*). Taavitsainen (2010:33; 2002:205) proposes that the vernacularisation of medicine in England happened in four phases and that it followed the model of other registers, such as religious texts. The process started in the latter

half of the 14th century when remedy books and other recipe collections were supplemented by an increasing number of more advanced medical literature, raging from highly theoretical treatises to more practically oriented texts (Taavitsainen 2013:93). When texts were translated into English several different Latin treatises were often compiled in the same manuscript, making translators also editors of early English medical texts (Siraisi 1990:53). Although the division was not always straightforward, according to Taavitsainen there were three different traditions of Middle English medical writing: learned medical texts, surgical treatises, and remedy books which had their roots in Old English texts (2012:94). In addition to these traditions new types of medical texts emerged as well during the course of the medieval period, including regimens and health guides (French 2003:121) and plague treatises (Siraisi 1990:121).

Latin was the *lingua franca* of learned medicine in England until the latter half of the 17th century (Taavitsainen 2002:205), and texts meant to reach the scientific communities of continental Europe continued to be written in Latin beyond the early modern period (Wear 2000:43). Therefore Latin medical texts served as the model for learned vernacular medical writing (Taavitsainen 2010:38). As a result scientific English borrowed writing conventions from Latin texts, such as syntactic features, vocabulary, and the overall structure of argumentation (Taavitsainen 2010:38). Translating theoretical material from Latin into English was a new phenomenon that emerged in the late 14th century (Taavitsainen 2012:97). The translators of medical works had to work their way around Latin medical terms that had no Middle English equivalents and in doing so created a new technical terminology for English medical texts (Siraisi 1990:53; Taavitsainen 2012:97). Therefore by the late medieval period English was better equipped to discuss abstract scientific concepts than ever before, and according to Siraisi by the late 15th century English medical texts were as important to the medical community as Latin texts (1990:53). Choosing English over Latin was also driven by nationalistic notions of improving the status of one's native language (Taavitsainen 2012:93). Latin, however, continued to be more prestigious

throughout the medieval period, and it was not unusual for writers of vernacular texts to apologise for using the less sophisticated language (Taavitsainen 2012:93).

The different traditions of Middle English medical writing varied in terms of how much theoretical discussion they were likely to include (Taavitsainen 2012:93). Learned vernacular compilations of Latin source material aimed to make medical theory available to those who could not read the original texts, and they were frequently supplemented by commentaries written by the translators (Taavitsainen 2012:100). The ways of describing diseases and other conditions were largely modelled after the ancient Greek and Arabic texts (Siraisi 1990:128), and the Arabic model, as demonstrated by Avicenna's *Canon*, was especially influential among writers of surgical treatises (Taavitsainen 2012:105). Vernacular remedy books and recipe collections could be learned or practical in their approach (Taavitsainen 2012:106-107). Learned remedy books illustrated the theory of healing practices, whereas more practically oriented recipe collections' function was to offer quick references (*ibid*.) Because they date back to the Old English period remedy books and recipe collections were a well-established tradition of English medical writing by the medieval period, and therefore they were more uniform than the less standardised learned and surgical treatises (*ibid*.).

During the Middle Ages new genres of medical writing emerged for previously unrecorded diseases and new fields of medicine, such as astrological medicine and alchemy (Taavitsainen 2012:96). Especially the bubonic plague had a huge cultural impact, and attempts to fit the new disease within the framework of existing medical theory resulted in a whole new category of medical writing — the plague treatise (Siraisi 1990:128). According to French (2003:121) regimens and health guides emerged between the 1250s and 1350s, and they were an especially important genre for learned physicians, because they gave the learned an opportunity to emphasise their superior knowledge of individualised medicine based on different constitutions and environments. Through health guides learned physicians demonstrated their understanding of how

age, biological sex, illnesses, diet, exercise, sleeping habits, sex, and bathing affected the human body (French 2003:121).

In the medieval period medical texts were mostly owned by professional practitioners and people with high social status, because literacy was largely restricted to the upper levels of society (Taavitsainen 2012:98-99). However, in the 15th century the rising middle class widened the potential readership of vernacular medical texts (*ibid*). Vernacular texts were also the main source of medical theory to those medical practitioners who were not literate in Latin (Taavitsainen 2012:100), and although medieval vernacular medical texts have often been associated with lay medicine, they shared features with learned Latin texts (Taavitsainen 2012:98, 108). According to Taavitsainen the genres of English medical writing were yet to be standardised in the late medieval period and there was a high degree of variation between different texts, and therefore English medical writing "occupied an intermediate position between the world of learning and more popular attitudes" (2012:96). The learnedness of medical texts was defined by features of scholastic writing, such as references to authorities, and the scope and depth of the topics the texts covered (Taavitsainen 2012:108).

3.2. Early modern English medical texts (1500-1600)

The majority of medieval traditions of English medical writing continued into the early modern period, but they also went through changes as they were adapted for the needs of the early modern medical community (Taavitsainen 2010:30). The printing press transformed the way texts were reproduced and during the latter half of the 16th century printing also became increasingly precise and professional (Taavitsainen 2010:42). The readership of vernacular medical texts continued to grow (Taavitsainen 2010:30, 34-35; Wear 2000:47) and some writers made it explicitly clear that they expected their readers to come from a variety of backgrounds and assumed some of them to be mainly familiar with folk medicine (Wear 2000:69). Early modern English medical texts created a

spectrum with theoretically advanced treatises in one end and remedy books on the other, and the same texts were often be read by both professional medical practitioners and lay audiences (Wear 2000:40-41).

During the early modern period English began to challenge Latin as the language of learned medical discourse, but this change took time and there were arguments both for and against using English (French 2003:204-205). Writing in Latin ensured that only the members of the university-educated learned community could access medical knowledge, which some learned writers saw as an essential part of protecting their profession, keeping learned medicine separate from lay medicine, and preventing ignorant lay people from practicing medicine, which was seen as potentially dangerous (Wear 2002:41-42). Furthermore, some argued that English was not a sophisticated enough language for expressing theoretically complex ideas and therefore writing in English would drop the standard of medical texts and medicine as a science (Taavitsainen 2010:38-39; Wear 2000:42). However, despite the resistance English began to be accepted as a language of scientific discourse by the end of the 16th century (Taavitsainen 2010:39). Advocators of Latin were accused of elitism and many campaigned for educating the common people or, as they saw them, the ignorant masses that needed enlightenment (Porter 1987:13; Wear 2000:43, 60). In addition, publicly available knowledge was one of the cornerstones of the new empirical philosophy, which prompted some writers to choose English over Latin (Wear 2000:391). There were also several supporters of traditional scholastic medicine who argued for using English instead of Latin, based on the fact that the authorities their medicine was built on had written in Greek or Arabic, i.e. in their native languages (Taavitsainen 2010:34).

According to Taavitsainen the vernacularisation of English medical texts took place in four phases (2010:33; see section 3.1. above). The second phase of vernacularization spanned from 1475 till the end of the first half of the 16th century, during which medieval writing conventions continued into the early modern period relatively unchanged (Taavitsainen 2010:39). Vernacular

texts continued to be mostly translations from Latin and only few original English works were published (*ibid*.). The most drastic change was the emergence of printing culture in England, and although texts continued to be copied by hand and the collection of texts printing presses had available to them was relatively small, this eventually changed fundamentally the distribution of information (Taavitsainen 2010:39).

During the third phase of vernacularisation, which spanned from 1540 to 1600, there was a growing market for vernacular medical books which expanded as literacy rates rose between the years 1558 and 1640 (Taavitsainen 2010:34-35; Wear 2000:43). People had to and sometimes chose to be their own physicians (Porter 1987:28-29, Wear 2000:20), which created a demand for vernacular books on diagnosing and curing diseases (Wear 2000:40, 49-50). Apart from practical reasons, interest in vernacular medical books was also a question of status. Owning books and being able to discuss scientific topics were markers of a higher social standing, and therefore especially the rising middle class were a commercially important target group for publishers of vernacular books (Wear 2000:43). Although in the 16th century advanced material was still mostly published in Latin and English medical texts remained fairly conservative (Taavitsainen 2010:43), the third phase of vernacularisation saw an increase in the number of original English medical texts (Taavitsainen 2010:43), and health guides and regiments were an especially productive genre of English medical writing (Taavitsainen 2010:42). In the 16th century English medical texts were largely written within the framework of the renaissance revival of classical knowledge, and the texts often relied on the authority of ancient Greek and Arabic writers (Wear 2000:35), although Arabic medicine was somewhat less influential than it had been in the medieval period (*ibid*.).

In the 17th century, when the fourth and last phase of vernacularisation took place, English medical writing underwent the most notable changes as the basis of scientific knowledge and the way medicine was studied were transformed by several sociocultural changes (Taavitsainen 2010:47-48; see section 2.2. above). This created new writing conventions, such as backing up

arguments with eyewitness accounts, as well as new genres, such as the experimental essay (Taavitsainen 2010:47-48). The new natural philosophy based on observation also inspired a more subjective style of writing, which reported the author's first-hand experiences (Taavitsainen 2010:50). The most important development for the vernacularisation process was the establishment of The Royal Society in 1660, which started publishing the first scientific journal, *Philosophical Transactions*, from 1665 onwards (Taavitsainen 2010:49-50). The articles were written in English and their language was regulated by guidelines, which contributed hugely towards establishing English as a scientific language (Taavitsainen 2010:49-50). Although Latin continued to be used within international contexts, in England the medical community eventually adopted the vernacular as their primary language, and out of the 238 medical books printed in England between the years 1640 and 1660 only 31 were Latin medical texts, and the remaining 207 were written in English (Wear 2000:41).

Although medical writing underwent changes during the early modern period, these changed affected mostly the top level of scientific discourse, as represented by The Royal Society. Many genres of medical writing retained traditions from the medieval period and remained mostly unchanged throughout the early modern period (Taavitsainen 2010:51-52). Some genres were especially conservative, such as recipe collections (Marttila 2010:108), health guides (Suhr 2010:117) and surgical treatises (Tyrkkö 2010:124). Recipe collections and health guides were both well-established genres of medieval medical writing, and they continued into the early modern period without major changes (Marttila 2010:108; Suhr 2010:117). In the case of surgical treatises, their conservativeness was closely linked to surgeons' desire to establish a learned branch of surgery, which lead them to emphasise its the antique roots (Wear 2000:211-212, 220; see section 2.2. above).

3.3. Previous studies on references

According to Taavitsainen (2002:207) when analysing scientific writing one of the aspects that should be taken into consideration is evidentiality, i.e. what the sources of knowledge are and how the sources are referred to. Evidence can based, for instance, on empirical observation or on what previous authorities have stated, and through studying these evidential features it is possible to analyse the influence of different ideological approaches (*ibid*.). References to authorities were a prominent feature of traditional scholastic medical writing and a way of demonstrating the learnedness of the author (Taavitsainen 2010:35; 2012:108), and therefore through analysing them it is possible to gain insight into how different traditions of English medical writing changed between the 14th and the 17th century, and to what extent traditional features of medieval scholastic writing continued to be used in the early modern period. In this section I will discuss and compare two previous studies on references: a study by Taavitsainen and Pahta on medieval medical texts (1998) and a study by Taavitsainen on early modern medical texts (2009).

In their article "Vernacularisation of Medical Writing in English" (1998) Taavitsainen and Pahta examine typical linguistic features of medieval and early 16th century scholastic writing, including references to authorities. According to Taavitsainen and Pahta "[a]ppealing to authorities was essential to scholastic thought, and science had its own hierarchy of authorities" (1998:167). Frequent references especially to ancient Greek and Arabic authorities showed that the author subscribed to the scholastic learned tradition (1998:168). Therefore the frequency of references is one of the factors that set apart scholastic style of writing from the new empirical style that started to emerge in the late 16th century (*ibid*.). The texts Taavitsainen and Pahta study come from the *Corpus of Early English Medical Writing* which at the time of their study had about 80,000 words and covered the time period 1375-1550 (1998:165-166). The texts reference a wide range of authorities from ancient and contemporary authors to biblical figures, but most names are mentioned only once and therefore the study focuses only on the most frequently referenced authors (1998:168-169). The references included in the study are the names of ancient authorities *Galen*,

Hippocrates, *Avicenna*, *Rhases*, *Haly Abbas*, *Averroes*, *Aristotle*, *Plato*, and *Ptolemy*; the names of medieval Latin authors *Lanfrank*, *Bernard of Gordon*, *Gilbertus Anglicus*, *Guy de Chauliac*, and *Constantine*; and general groups of people, i.e. the common nouns *authors*, *doctors*, *leeches*, *physicians*, *masters*, and *philosophers* (1998:171-173). According to Taavitsainen and Pahta out of the ancient authorities *Galen*, *Hippocrates* and *Avicenna* are referred to most frequently (1998:169), and medieval Latin authors are most likely to be referenced in surgical texts (1998:170).

In addition to looking at the frequency of references Taavitsainen and Pahta also study their structure. The most common linguistic structures are *X says that*, *as X says, X tells* and *X speaks of this*. Other commonly used verbs are *teach*, *show*, *prove*, *approve*, *affirm*, *confirm*, *treat*, *hold*, *put*, *deem*, *witness* and *testify* (1998:174). Taavitsainen and Pahta argue that the choice of verbs and the linguistic form of these references suggest that what the referenced authorities say is taken "as a fact, something to be taken for granted, trusted and relied on" (1998:175). This is further highlighted by the lack of verbs which denote modality, such as *suggest* or *claim* (*ibid*.). Furthermore, the texts criticise the authorities they reference only very rarely (*ibid.*).

Taavitsainen and Pahta conclude that the amount of references and whether the references are specific (references to names) or general (references to common nouns) is determined by the tradition of writing the text represents and their intended audience (1998:181). Some texts in the corpus, such as learned texts on specialised fields, are written by university-educated physicians for other university-educated physicians, whereas others, such as health guides and remedy books, are aimed at a wider and more heterogeneous audience. (1998:160). Learned texts and remedy books also represent different traditions of medical writing. Learned vernacular texts were largely modelled after the Latin example (1998:159) and the earliest learned texts in English were translations from Latin, which had an effect on the writing style of English learned texts (1998:157). Remedy books, on the other hand, have their roots in Old English medical texts and therefore they were influenced by the Latin model to a lesser extent than learned texts

(1998:159). Overall, according to Taavitsainen and Pahta references to authorities were most common in learned texts written for other medical professionals (1998:181).

In the article "The pragmatics of knowledge and meaning" (2009) Taavitsainen expands on the study by Taavitsainen and Pahta (1998) and examines how features of the scholastic genre continued to be used in early modern English, whether references were used in new ways that were not present in medieval medical writing, and how the shift from scholasticism to empiricism affected the use of references (2009:38). The corpus used in the study is *Early Modern English Medical Texts* which covers the time period 1500-1700 (2009:39). Taavitsainen studies references to the following authorities (a) and general groups of people (b):

(a) *Galen, Hippocrates, Aesculapius, Avicenna, Albucasis, Rhazes, Haly Abbas, Averroes, Aristotle, Plato, Ptolemy*

(b) *philosophers, authors, practitioners, physicians, poets* (2009:41).

In addition to studying the frequency of references, Taavitsainen also compiles keyword lists of words that occur frequently with the references in one category of the corpus, specialised treatises (2009:41). These words are divided into three groups: lexical items, grammatical items, and proper nouns (*ibid*.). According to Taavitsainen the overall the frequency of the references was declining during the early modern period, which reflects the decline of the scholastic tradition in favour of the empirical approach (2009:44). The results indicate that the decline seems to have started during the second half of the 16th century (2009:56).

In addition to reporting verbs, the words that appeared frequently in connection with references were names of other authorities, which indicate passages where references occur in clusters (2009:44). Taavitsainen argues that these clusters of references mark passages where there has been a stylistic switch back to scholastic style of writing, which might be evidence of an undergoing process of one style of writing gradually replacing another (2009:44-45). Although the results indicate that the number of references declined between the years 1500-1700 in the majority

of the categories, regimens and health guides are a notable exception (2009:50) In this category the number of references declined rapidly during the first half of the 17th century, but increased again considerably during the latter half of the 17th century (2009:50). Taavitsainen argues that references gained a new function which was to add "an aura of learnedness" to regimens and health guides (*ibid*.). This use of references became already evident towards the end of the 16th century, and the results suggest that the new function became an established feature of the style of regimens and health guides during the 17th century (2009:50-51).

When comparing results from Taavitsainen and Pahta (1998) and Taavitsainen (2009) it seems that the use of references changed drastically during the early modern period. In addition to the notable difference in frequencies, in medieval medical texts there are more references to authorities in learned texts influenced by the Latin model than in more popular medical texts (Taavitsainen and Pahta 1998:181). In early modern texts, however, references became to be more common in regimens and health guides than in other categories, including categories that had texts mainly written for and by university-educated physicians (Taavitsainen 2009:50). In the early modern period the references also gained new functions, and they were used to make the health guides sound more learned, while actual professional medical texts were using references less and less (*ibid*.). Because references were a prominent feature of learned medical writing for centuries before their decline, it is possible that the general public associated learnedness with a high frequency of references and therefore the new function mainly manifested in texts that aimed to reach a heterogeneous audience.

The results of these two studies show that the use of references changed dramatically between the 14th and the 17th century, and they demonstrate how underlying changes in the ideological basis medicine affected medical writing. The present study examines references to three of the authorities included in the previous studies: Avicenna, Hippocrates, and Galen. As all of these three names were fundamentally important to scholastic medicine (French 2003:100; Siraisi

1990:15-16; see 2.1. above), they are likely to have been especially affected by the ideological changes of the early modern period, and by studying them in detail I hope to gain further information about how the use of references changed over time and how different traditions of medical writing used references.

4. Historical linguistics

4.1. Historical pragmatics and discourse analysis

Historical linguistics investigates language variation over time and its aim is to study how languages have changed and why they have changed in certain ways rather than in others (Goossens 2010:100). The reasons behind language change can be divided into language internal and language external factors (Lindquist 2009:168-169). Language internal change occurs, for instance, when a shift in one aspect of phonology or morphology creates overarching changes in the whole linguistic system (*ibid*.) Language external factors, on the other hand, are extralinguistic causes for language change, such as the effect of ideologies and historical events on language use (*ibid*.) Historical pragmatics and discourse analysis are branches of historical linguistics that are concerned with language external factors, and they study historical texts against the social context of the time period they originate from (Hiltunen and Skaffari 2004:3; Taavitsainen and Fitzmaurice 2007:14).

Compared to other fields of historical language research historical pragmatics is a relatively new approach that started to become established in the mid-1990s, and it was developed especially by the works of Andreas H. Jucker and Irma Taavitsainen (Hiltunen and Skaffari 2004:2; Jucker 2010:110). Although originally pragmatics focused primarily on the study of spoken language, it has since expanded to include written texts, which are seen as communicative acts comparable to spoken situations (Jucker 1995:9-10; Taavitsainen and Fitzmaurice 2007:14). According to Jucker historical pragmatics is based on the notion that "[texts] have senders with communicative intentions and audiences to whom they are addressed and whom they try to

influence in certain ways" (1999:16). Furthermore, these texts are produced within the framework of different historical discourse communities and they are shaped by their sociocultural context (Jucker 1995:11; Taavitsainen and Fitzmaurice 2007:12, 16). Historical pragmatics is interested in specific stages of languages as well as pragmatic motivations for language change (Jucker 2010:110). The approach can be further divided into several subfields, such as pragmaphilology, which studies historical stages of a language synchronically from a pragmatic point of view, and diachronic pragmatics, which investigates language change over time (*ibid*.) The diachronic approach focuses on change caused by the situational context, including changes in social structures and different traditions of language use (Jucker 1995:6). Therefore awareness of the historical context in which the texts were produced and knowledge of the literary traditions behind individual texts are seen as vital to understanding historical language use (Taavitsainen and Fitzmaurice 2007:22, 25).

Historical discourse analysis is a field closely related to historical pragmatics and there is plenty of overlap between the two (Taavitsainen and Fitzmaurice 2007:14). It includes both synchronic explorations into different stages of language history as well as diachronic studies of changes in discourse (*ibid*.) According to Jucker (2010:110-11) historical discourse analysis can be divided into three branches: discourse analysis proper, diachronically oriented discourse analysis, and discourse oriented historical linguistics. Discourse analysis proper roughly corresponds to the pragmaphilological approach of historical pragmatics and the studies in this field are mainly synchronic (Jucker 2010:110-111). Diachronically oriented discourse analysis is, as the name suggests, mainly concerned with the diachronic change of different discourse functions (*ibid*.) The third branch, discourse oriented historical linguistics, aims to discover pragmatic motivations for changes in different areas of linguistics, such as semantics (*ibid*.)

Navigating the overlapping areas of these two theoretical frameworks can be challenging and some areas of historical language research can benefit from a combination of both

historical pragmatics and historical discourse analysis (Hiltunen and Skaffari 2004:2-3). Hiltunen and Skaffari propose using the term *historical discourse linguistics* for an approach that combines aspects of pragmaphilology and diachronically oriented discourse analysis:

> The three elements of the term aptly capture the essential dimensions of the field: by referring to our work as 'historical discourse linguistics' we emphasise that the approach is very much a part of historical linguistics, with a solid philological basis, and broader than discourse analysis in its narrow sense. We are convinced that the synchronic study of the function(s) of linguistic phenomena in historical data provides an important link between a more formal or traditionally philological synchronic description of any linguistic phenomenon and a diachronic study of its evolution. (2004:3)

The aim of historical discourse linguistics is to study language use within the context of specific discourse communities and the different communicative functions language can have in different contexts (Hiltunen and Skaffari 2004:3). Because pragmatic and discourse analytic approaches to historical language use are relatively recent compared to other areas of historical linguistics, the names and definitions of different theoretical frameworks still have overall a lot of variation (Hiltunen and Skaffari 2004:2, Jucker 2010:110-111).

As noted by Biber et al. (2007:6), discourse studies are interested in the underlying ideologies and communicative practices of different categories, and understanding the social context in which they appear is essential for studying the different rhetorical choices and how the audience receives them. The terminology of discourse analysis is varied and both *genre* and *text type* can be used to describe either categories defined by their social function or their linguistic features (Hiltunen and Skaffari 2004:8). In historical linguistics genre often refers to categories defined by their function and other extralinguistic factors, whereas text types are categories defined by specific linguistic characteristics (Hiltunen and Skaffari 2004:8). Besides genre, *register* is also used for describing context-based varieties, and textual categories defined by the topic are often called *fields* (*ibid*.). In any case, discourse analytic approaches to language research are based on the idea that knowledge of different genre or register conventions and text types are fundamental to people's communicative competence, and in the context of historical analysis this means that the researcher has to be aware of the historical context to be able to take into account how different conventions shaped writers' and readers' understanding of texts (Hiltunen and Skaffari 2004:9).

These conventions also change over time to meet the changing sociocultural needs of the discourse community and as a result new genres are created, old conventions are adapted to new purposes, and genres that are no longer useful to the community eventually subside (Taavitsainen 2002:202).

4.2. Corpus linguistics and historical discourses

Corpus linguistics is the study of language through representative samples that have been arranged into a corpus, which is then searched for specific linguistic features by using computerised tools (Lindquist 2009:1). When corpus linguistic methods are applied to discourse analysis, the search needs to locate the parts of the text that correspond to the relevant communicative functions (Biber et al. 2007:11). One of the main methodological problems is defining the unit of analysis, which can be anything from complex phrases to single words and smaller linguistic elements (Biber et al. 2007:11; Meyers 2002:115). The goal is optimising and balancing precision and recall, so that the hits of the corpus search are mostly relevant to the study and that as many of the relevant cases as possible are found (Lindquist 2009:44). According to Biber et al. (2007:17-18) corpora that are specialised in a specific discourse are the most suitable for discourse analysis, as the results are more likely to be reliable than with corpora that include a wide scope of different registers. When evaluating the results of a corpus analysis it has to be taken into account how well the corpus represents the genre studied and to what extent the results can be used to make generalisations about the genre as a whole (Lindquist 2009:43).

The methods of corpus linguistics combine both qualitative and quantitative analysis (Lindquist 2009:25-26). Quantitative analyses are based on frequency counts which are used to test and formulate linguistic hypotheses and theories (Lindquist 2009:25-26; Meyers 2002:102). According to Meyers (2002:119-121, 124) statistical analysis of the results is necessary because the conclusions of the study become more reliable, and the quantitative descriptions can be used to support qualitative explanations. Meyers breaks the process of statistical analysis into three parts:

> 1. evaluating the corpus from which the results are to be obtained to determine its suitability for statistical analysis;
> 2. running the appropriate statistical tests;
> 3. interpreting the results, and finding linguistic motivations for them. (2002:121)

The material studied needs to be extensive enough to justify statistical claims, and the statistical findings need to be based on linguistic choices for them to be meaningful (Meyers 2002:121-122). All corpus linguistic studies also include qualitative methods at least to some extent as determining frequencies of linguistic features requires categorising them in some way, and these categories need to be based on qualitative research (Lindquist 2009:25-26; Meyers 2002:107-108). Furthermore, most studies require examining individual examples in further detail to understand what the frequencies actually suggest (Lindquist 2009:26). When studying results from two corpora or different categories of one corpus that differ in size, the raw frequencies must be normalised to make comparisons possible (Biber et al. 1998:263; Lindquist 2009:42). The formula for normalised frequencies from Bibet et al. (1998) is commonly used (Meyers 2002:126). If, for instance, the frequencies are normalised per 10,000 words, the raw figures are first divided by the overall word count of the corpus or the category and then multiplied by 10,000 (Biber et al. 1998:263).

Corpus linguistics is an especially important tool for historical linguistics because it facilitates working with large amounts of material at once, and access to a wide sample of texts makes the research more systematic (Lindquist 2001:169; Jucker et al. 1999:17). Computerised corpus tools radically changed historical linguistics during the course of the 1990s because they enabled linguists to ask new kinds of research questions that were too extensive for purely manual work (Jucker et al. 1999:18-19). According to Taavitsainen and Fitzmaurice (2007:17) corpus linguistic techniques shaped historical pragmatics and discourse analysis into an empirically oriented branch of linguistic research. Results from large bodies of representative texts enable quantitative analysis of historical language and they can be used to validate the claims made by historical discourse analysis (Taavitsainen and Fitzmaurice 2007:27). The statistical methods of quantitative analysis are extremely helpful because they can be used, for example, to determine

which instances of language use were the standard and which unorthodox (Taavitsainen and Fitzmaurice 2007:29).

Corpus linguistic studies on discourse are often variationist in their approach and their analyses are based on comparing registers or text types with each other (Biber et al. 2007:10; Rissanen et al. 2011:1). Although corpus linguistics is not a theoretical framework but rather a methodology, it is closely connected with the notion that language changes over time and varies when different groups of people communicate with each other (Lindquist 2009:1). According to Reppen et al. (2002:vii) variation is fundamental to human communication because language users make different linguistic choices in different situations, and the same meanings can be expressed in different ways by different individuals. Variation is also often systematic, and it is determined by extralinguistic factors, including the communicative situation, the aims of the writer or the speaker, relationships between the participants, and demographic backgrounds (*ibid*.). Interpretations of variation need to come from empirical studies of representative samples of language use to be reliable (Reppen et al. 2002:vii-viii).

In the case of historical pragmatics and discourse analysis studying variation within one category or between several categories can give new insights into how and why genres and text types change (Rissanen et al. 2011:1). According to Rissanen et al. (2011:2) the variationist approach to diachronic historical linguistics is especially focused on analysing how language external factors motivate writers to be either conservative or innovative. Historical variationist studies typically rely on diachronic corpora because they provide an easy access to texts from different time periods, and the statistical possibilities of corpus linguistics can be used to quantify and verify the level of variation between different texts (Rissanen et al. 2011:4). Corpus linguistics methods also make it possible to combine statistical quantitative techniques with qualitative analysis of data (*ibid*.).

Although corpus linguistics can be extremely useful for historical language research, there are also potential problems and being aware of them is vital for conducting reliable studies on historical material (Taavitsainen and Fitzmaurice 2007:29). When it comes to historical pragmatics the scope of purely quantitative corpus linguistic methods is limited, unless they are complemented by qualitative analysis (Taavitsainen and Fitzmaurice 2007:17-18) If the pragmatic functions of linguistic features are studied based on just their frequency alone, the depth of the analysis is limited to what can be inferred from the numbers, and the results of the analysis can be unreliable (Taavitsainen and Fitzmaurice 2007:27-28). Because of the potential issues, according to Taavitsainen and Fitzmaurice (2007:27) studies based on historical pragmatics and discourse analysis need to be especially transparent about the way they adapt corpus linguistic methods.

Furthermore, historical texts can differ widely from modern expectations, and therefore not fully understanding the nature of the texts studied can lead to serious problems (Hiltunen and Skaffari 2004:4; Taavitsainen and Fitzmaurice 2007:28). Hiltunen and Skaffari (2004:5) also stress that because until very recently writing was not a common way of communicating knowledge, when studying the language of earlier cultures their overwhelming orality needs to be taken into consideration. The relationship between spoken and written discourses has been complex throughout the history of English, and it was usual for written records to retain features of the oral culture in varying degrees (Hiltunen and Skaffari 2004:5-6). In the case of medical writing recipes and medical advice in verse form were especially closely linked to orality (*ibid*.) In addition, it is important to be aware of the various editorial processes which historical texts have inevitably been through (Hiltunen and Skaffari 2004:4) Some editorial policies decontextualise texts, and their primary focus can often be standardisation rather than the preservation of variation (*ibid*.).

5. Material and methods

5.1. Corpora

Medical texts are a particularly interesting branch of English scientific writing because they date all the way back to the Old English period and they can be divided fairly easily into several distinct registers (see section 3 above). I chose to focus on English medical writing also because of the corpora available. The two corpora used in this study are *Middle English Medical Texts* and *Early Modern English Medical Texts*. These corpora are part of the *Corpus of Early English Medical Writing* which is a three-part corpus of English medical texts covering the time period 1375-1800. The first part, *Middle English Medical Texts* (MEMT), was released in 2005 and the second part, *Early Modern English Medical Texts* (EMEMT) was released in 2010. The last part, *Late Modern English Medical Texts* (LMEMT), which covers the time period 1700-1800, has not yet been released at the time of the present study. MEMT and EMEMT are both relatively large and cover together 300 years of English medical writing, which gives enough data for studying diachronic changes. The two corpora have been divided into categories that represent different areas of medical writing, and although there are some differences between the category divisions of MEMT and EMEMT, the categories are comparable and therefore the corpora can be used to study how different traditions of English medical writing developed and changed.

5.1.1. MEMT (1375-1500)

The material in MEMT is from between the years 1375 and 1500, and the corpus contains all in all about half a million words. The corpus consists of 86 texts and they represent a wide range of medieval medical writing from learned treatises aimed at other medical professionals to texts written for lay audiences. The texts in MEMT have been divided into four categories:

1. *Surgical texts*
2. *Specialized texts*
3. *Remedies and materia medica*

4. *Verse*

Surgical texts and *specialized texts* represent the more learned end of medical writing, whereas texts in the categories *remedies and materia medica* and *verse* are aimed at a wider audience and are close connected with lay medical practices (see 3.1. above). MEMT also has an appendix, which contains two corpus compendiums and a glossary of herbs from around the year 1330, but this material was not included in the present study. The source material of the corpus comes from a variety of editorial backgrounds, which is why the manuscripts in the corpus also vary in how closely they resemble the original form they took in the medieval period (Taavitsainen et. al 2005). The editorial policy in compiling the corpus has not been to level the variation caused by the different editorial practices but rather the texts in MEMT are faithful reproductions of the source materials, and the focus has been on representing the variety of different medieval medical writing traditions (*ibid*.).

5.1.2. EMEMT (1500-1700)

EMEMT consists of about 450 texts and has all in all about 2 million words. The corpus covers the time period 1500-1700. The texts in the corpus have been limited to printed material, which means that the corpus represents the more prestigious and commercial end of early modern medical writing (Taavitsainen et al. 2010). Although the manuscript material has been excluded for practical reasons, the texts in EMEMT offer a solid representation of a wide scope of early modern medical discourse and the corpus is therefore well-suited for studying different traditions of medical writing (*ibid*.) In addition to the original texts, EMEMT includes normalised versions where spelling variations have been replaced by normalised spellings. The texts in EMEMT have been divided into six categories, and the second category has been divided further into five subcategories. The first and the second category roughly correspond to the category *specialized texts* in MEMT:

1. *General treatises and textbooks*

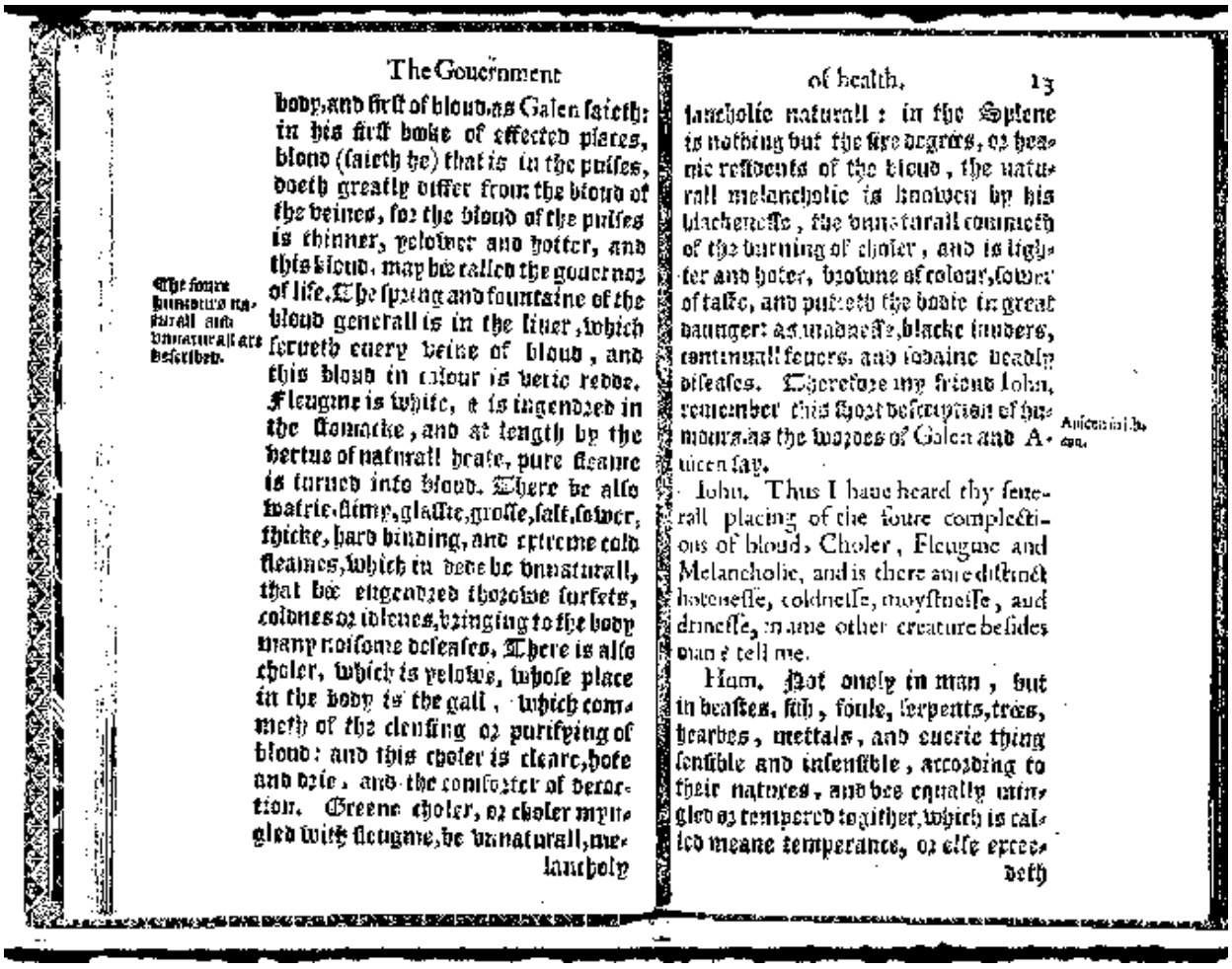
2. Specific treatises:
    2a. *Specific diseases*
    2b. *Specific methods*
    2c. *Specific therapeutic substances*
    2d. *Midwifery and children's diseases*
    2e. *Plague*

The third and fourth category have material similar to the category *remedies and materia medica* in MEMT, and the fifth category in EMEMT corresponds to the category *surgical texts* in MEMT:

3. *Recipe collections and materia medica*
4. *Regimens and health guides*
5. *Surgical and anatomical treatises*

The sixth and last category in EMEMT is *Philosophical transactions*, which contains articles from the first scientific journal, published by the Royal Society. Unlike the other categories, which have texts from the beginning of the 16th century to the end of the 17th, the articles in the sixth category were written during the last half of the 17th century, after the establishment of the Royal Society in 1660. EMEMT also has an appendix, a collection of texts called *Medicine in Society*, but the appendix was not included in the present study.

Some texts in EMEMT have comments in the margins, which have been included in the corpus as separate text files. The contents of these files have been taken into account in the present study because the comments written in the margins often give further information on references made in the running text. For example, in William Bullein's *The Gouernement of Health* (1595), a reference to Avicenna has more specific details in the margin:



The Gouernment

body, and first of blood, as Galen saieth: in his first booke of effected places, blood (saieth he) that is in the pulses, doeth greatly differ from the blood of the veines, for the blood of the pulses is thinner, yelower and hotter, and this blood, may bee called the gouernor of life. The spring and fountaine of the blood generall is in the liuer, which serueth euery veine of blood, and this blood in colour is verie redde. Fleugme is white, it is ingendred in the stomacke, and at length by the vertue of naturall heate, pure fleame is turned into blood. There be also watrie, slimy, glaire, grosse, salt, sower, thicke, hard binding, and extreme cold fleames, which in deede be vnnaturall, that bee engendred thorowe surfets, coldnes or idlenes, bringing to the body many noisome diseases. There is also choler, which is yelowe, whose place in the body is the gall, which commeth of the clensing or purifying of blood: and this choler is cleare, hote and drie, and the comforter of deoction. Greene choler, or choler mingled with fleugme, be vnnaturall, me-

The foure humours naturall and vnnaturall are described.

of health. 13

lancholie naturall: in the Splene is nothing but the fire degrees, or heamie residents of the blood, the naturall melancholie is knowen by his blacknesse, the vnnaturall commeth of the burning of choler, and is lighter and hoter, browne of colour, sower of taste, and putteth the bodie in great daunger: as madnesse, blacke iaunders, continuall feuers, and sodaine deadly diseases. Therefore my friend Iohn, remember this short description of humours, as the wordes of Galen and Auicen say.

Auicen in lib. can.

Iohn. Thus I haue heard thy seuerall placing of the foure complections of blood, Choler, Fleugme and Melancholie, and is there anie distinct hotenesse, coldnesse, moystnesse, and drinesse, in anie other creature besides man? tell me.

Ham. Not onely in man, but in beastes, fish, fowle, serpents, trees, hearbes, mettals, and euerie thing sensible and insensible, according to their natures, and bee equally mingled or tempered together, which is called meane temperance, or else excee-

deth

Picture 1. Bullein, William. 1595. The Gouerenment of Health (EEBO *7 March 2014)*.

In EMEMT, the comment in the margin is marked in the running text with a number:

> (1) Therefore my friend Iohn, remember this short description of humours, [/46./] as the wordes of Galen and Auicen say. (1595 Bullein *The Gouernement of Health*)

In the comments file, the text written in the margin has been marked with the number of the folio or page (in this case f.13r) and the number used in the running text (in this case 46):

> (2) [^46. f.13r^] Auicen in lib. can. (1595 Bullein *The Gouernement of Health*)

Examples 1 and 2 illustrate a fairly common practice where the reference in the running text mentions only the name of the author and the comment in margin adds further details, such as which work is being referred to.

5.2. Methods

The methods of this study are a combination of qualitative and quantitative analysis, and they are based on the frameworks of historical discourse analysis and corpus linguistic methodology (see section 4 above). I performed a corpus search on references to three names: *Avicenna*, *Hippocrates* and *Galen*. I then went through all the hits and analysed the tone and specificity of these references by examining them in their immediate textual context. To study variation between different registers of medical writing and diachronic change I examined the results within the categories of the two corpora as well as compared them between four different year groups: 1375-1500, 1500-1599, 1600-1649, and 1650-1700. I accessed the two corpora by using the corpus tool AntConc, v3.2.4.

To account for spelling variations, such as *Hypocrates* for *Hippocrates*, I used the normalised version of EMEMT, which allowed me to search for *Avicenna, Hippocrates* and *Galen* and get the results of other spellings of the names as well. The normalised version does not account for abbreviated forms of the names, such as *Gal*., *Hip*., and *Avic*. The vast majority of these shortened forms, however, occurred in the comment files. When the reference in the comment file was paired with a reference in the running text I counted these as one reference, because the references in the margins normally function as added detail rather than as independent references. References in the margins that did not correspond to a reference in the running text were excluded because in these cases there was not enough context to analyse the tone of the reference. Therefore I did not perform a separate search on the shortened forms of the names. Only the abbreviated forms in the margins that are paired with an in-text reference were included in the study.

MEMT does not have a normalised version and therefore I searched for references with different spellings of the three names. The search terms I used are presented in the following table:

Table 1. Spelling variation in MEMT

Avicenna	**Hippocrates**	**Galen**
Auicen	Ypocras	Galien
Auisene	Ipocras	Galion
Auicenne	Ippocras	Galioun
Auycen	Ipocrus	Galean
Auycene	Ipocrase	Galienus
Auycenne	Iprocras	Galiene
Auyceen	Iporace	G
Auysenne		G.
Avycenna		Galyen
Avecene		Galyene
Avycenn		Galye
Avicenna		Galyon

I compiled this list of names by searching MEMT for reporting words such as *seith*/*seid* and *after* (as in *after Galen*), which gave me concordances with references to these authorities. These examples illustrated the general patterns of the spelling of these names: Avicenna starts with *av-* or *au-*, Hippocrates starts with *yp-* or *ip-*, and Galen starts with *gal-*. I used AntConc's wordlist tool to compile an alphabetical list of all the words that occur in MEMT and went through the words that started with these letters. This process produced the list in table 1. In the case of references to Galen, I also included the abbreviated forms *G* and *G.* because this way of referencing to him was part of the style Guy de Chauliac's texts. Guy de Chauliac is the author of 5 surgical texts out of the 14 included in MEMT, and therefore these abbreviated forms made up a large bulk of the references in this category. I found no examples of abbreviated forms of Avicenna or Hippocrates in MEMT.

Some occurrences of the names were irrelevant to the present study and were excluded from the results. These were cases where the name was, for example, a part of a name for some instrument or medicine:

> (1) Then we let the Juice stand for some days, or else we expose it some days to the Sun; and then we pour out the clearest softly by inclination; and keep it so, or else strain it through **Hippocrates breeches**; or through some cloth-strainer, if the Juice be not clear enough, or if it be aqueous. (1678 Charas *Royal Pharmacopoea*)

> (2) The way to stop the Bleeding as it is common in all Wounds, is, by bringing the Lips of the Wound close together by Suture, and by applying such Medicaments to them as have a drying and agglutinative faculty; as **Galen's Powder of Aloes** P j. thuris P ij and Hares-furre mixt with the White of an egg, applied upon a Pledgit, also a Plaister of the same Restrictives, with Compress and Bandage. (1676 Wiseman *Of Wounds*)

> (3) Neere vnto it in goodnes is an other wine which in the olde time was named Ablutum, and in Italie (speciallie in Lumbardie) it is commonlye termed by the name of **Auicen his wine**. (1574 Gratarolo *Health Of Magistrates And Studentes*)

These examples do not count as references to these authorities but rather the breeches (example 1), the powder (example 2), and the wine (example 3) have been named after them.

When analysing the tone of the references I divided them into three groups: *affirming*, *critical* and *neutral*. The *affirming* group consists of references that are used to back up specific views and opinions (example 4), references that aim to make the work of other authors' sound convincing (example 5), and references that criticise other authors for not following the teachings of these authorities (example 6):

> (4) And to remoue false opinions of ignorant men, for witnes I putte experience. **Auicen**, forsoþ, seiþ, 'experience ouercomeþ reson'; and **galien** in pantegni seiþ, 'No man ow for to trust in reson al-oon but 3it it be proued of experience.' (c.1400 Arderne *Fistula*)

> (5) OF the parts of the Body, there be many Divisions: The most approued is that of **Laurentius**, out of **Hippocrates**: That is, into parts Contained, or Containing. (1621 Burton *Anatomy Of Melancholy*)

> (6) -- the Physitians some fortie yeeres agoe, appointed that people should drinke fasting; and that onely by meanes of some cunning Physitians, willing by some plausible novelty to skrew themselves into the favour of the people. And it seemeth there is **some recent authoritie**, at least to beginne our meales with drinke. But **Galen** is flat against this preposterous custome of drinking thus fasting; averring, that to drink strong drink fasting, is very hurtfull for the nerves and nervous parts, and withall, hasteneth and procureth to the body many dangerous diseases, as Epilepsie, Apoplexie, and many others. (1633 Hart *Klinike*)

References that point out mistakes in the works of these authorities (example 7), references that criticise the whole body of their work (example 8) and references that criticise those who follow the teachings of these authorities I analysed as *critical*:

> (7) These side ligaments of the Yard where they are thick and round, spring from the lower part of the sharebone, and not the upper part as **Galen** supposed. (1671 Sharp *Midwives Book*)

> (8) -- for indeed and in truth, **Galen** never saw a Man nor Woman dissected in his life time, it being accounted abominable in his time to use such supposed cruelty upon a dead Corps, and therefore he dissected only Apes, which was the cause he wrote such [an] Apish Anatomy. (1651 Culpeper *Directory For Midwives*)

> (9) But **practicioners, ignorant of thinges and times**, or els of a purpose to deceiue [men], as many as they could, haue most impudently fathered many things vpon **Galen**, **Hippocrates** and Aristotle of the vertues of Aqua vitæ, or burnynge water, as writen by them. (1559 Gesner *Treasure Of Evonymvs*)

The last group, *neutral*, consists of references that are neither affirming nor critical in their tone. These include mainly discussions on issues of terminology (example 10) as well as references used to create an aura of learnedness (example 11). In addition, there are instances where the tone of the reference is very noncommittal, and the author simply reports what different authorities taught without expressing their opinion on them (example 12).

> (10) The second Region the later writers do call venter medius, or the middle belly and the chest. **Hippocrates** in his Aphorismes calleth it the vpper belly, but in reference to the lower: and the chest in his Booke De Arte, is taken for the whole trunke of the body, for he writeth; that the Liuer is scituated in the Chest. (1615 Crooke *Mikrokosmografia*)

> (11) And as **Galen** writeth, We write these things, neyther to the Germanes, nor to other rude and barbarous nations, no more then to Beares and Bores, and Lyons, and such like: but to the Gretians, and to them which though they bee Barbarians by kind, yet they followe the facions of Greece. So I write not these precepts for labouring men, but for studentes, and such as though they bee no students, doe yet folowe the order and diet of students. (1588 Cogan *Haven Of Health*)

> (12) After **Lanfrankes** intention, bicause they cary the matter sparmatike [sperm] to the ballockes. And therfore if they be cut a man is neuer apt to generation. Neuerthelesse **Galen** holdeth the contrary, as **Auicen** reciteth in the treatie of the lynage. (1579 de Chauliac *Gvydos Qvestions*)

Separating references that are used to create an aura of learnedness from affirming references was not always straight forward as some references could have fitted in both groups. To remain consistent, I analysed borderline cases that were related to the actual topic of the text as affirming, and the references that were not relevant to the subject matter as neutral. For instance, example 5 above was analysed as affirming because it discusses anatomy, the topic of Burton's text. In example 11, on the other hand, the reference to Galen is not related to advice on diet, nor is it directly related to reasons for addressing students, and therefore I analysed it as an example of the aura of learnedness function and placed in the *neutral* group.

The results were also analysed in terms of their specificity. The references that only mention the name of the authority and give no further details I categorised as *not specific*. If the text includes any further information on which work of the author is being cited, I analysed the reference as *specific*, which also included references that used phrases such as *ubi supra* and *aforesaid*:

> (13) And **Auicen .ij. canon~. cap. de sanguine/** saythe: Mans bludde and hogges bludde [man's blood and hogs' blood] be like in euery thynge: so that there haue bene that haue solde mans fleshe in stede of porke/ whiche thyng was nat spied/ tyll a mans fynger was fonde amo~ge y=e= fleshe. (1528 de Mediolano *Regimen Sanitatis Salerni*)

> (14) For in the cartilages or gristles, nor in bones, nor glandilous or cruddy flesh the sinewes bee not penetrate but in the teeth, as **Galen** sayth **in the booke aforesayd**. (1579 de Chauliac *Gvydos Qvestions*)

The references labelled as *specific* vary from each other notably as some of them only mention the name of a book while others give much more detailed information, such as chapter numbers. These differences in the scale of specificity were not however taken into account in the present study.

I compared the results of my analysis both diachronically and according to the corpus categories. When analysing diachronic changes I split the time period the two corpora cover into four parts: MEMT (1375-1500), 1500-1599, 1600-1649, and 1650-1700. The first part, 1375-1500, consists of all the material from MEMT, because the exact date of several manuscripts from this

time period is unknown and the estimates can vary by several decades or even by half a century. Estimating even which century the material is from would require extensive research and is beyond the scope of my study. The material from EMEMT was divided into three parts, with the 16th century as one period and the 17th century as two. Most changes in early modern medicine and English medical writing took place during the 17th century, and therefore I decided to study it in more detail. To study the differences between different areas of medical writing and how they changed, I compared the results according to the corpus categories of MEMT and EMEMT.

6. Results and analysis

The results of this study have been divided into three parts. In the first part I will analyse the results from the corpus of *Middle English Medical Texts* (MEMT) and compare the categories of medieval medical writing with each other. I will analyse how the references from different types of medical texts differ in terms of number, tone and specificity. In the second part I will similarly examine early modern medical writing by analysing the results from the corpus of *Early Modern English Medical Texts* (EMEMT). Finally, in the last part I will compare the results from MEMT and EMEMT to examine how the use of references changed between the years 1375-1700. To make comparisons between the different categories and the two corpora possible the results are given as normalised frequencies per 10,000 words, unless specified otherwise.

6.1. MEMT categories

6.1.1. Tone in MEMT

Medieval medicine was characterised by trust in authority and antiquity (French 2003:112; see section 2.1. above), and therefore references to ancient authorities were a fundamental part of medieval medical writing (Taavitsainen and Pahta 1998:167-8; discussed further in section 3.1. above). The results of this study reflect this as well and the references in MEMT are

overwhelmingly affirming in their tone, while critical and neutral references are exceedingly rare. The following table shows the breakdown of references between the four categories according to their tone. The numbers in this table indicate references to all three authorities studied here (Avicenna, Hippocrates, and Galen).

Table 2. Tone of references in MEMT by category, N/10,000 words (raw figures)

Category	**Affirming**	**Critical**	**Other**	**All references**
1. Surgical texts	20.80 (284)	0.44 (6)	1.03 (14)	22.27 (304)
2. Specialized texts	3.55 (31)	-	-	3.55 (31)
3. Remedies and materia medica	2.08 (45)	0.05 (1)	0.09 (2)	2.22 (48)
4. Verse	3.83 (12)	-	-	3.83 (12)
Total (all categories)	7.89 (372)	0.15 (7)	0.34 (16)	8.38 (395)

Surgical texts (category 1) make references to ancient authorities more frequently than any other category. Because of the hierarchy of medical practitioners in the Middle Ages writers of surgical texts were especially under pressure to appear learned (French 2003:120; see section 2.1. above). Therefore surgical texts were not only written for practical purposes but also for status, and they were a form of advertisement for surgeons who did not have a university degree to recommend them (French 2003:120, see section 3.1.). This might explain why references to ancient authorities are so frequent in surgical texts compared to the other categories. The higher frequency of references in this category can also be at least partially due to the style of texts attributed to one particular author, Guy de Chauliac, which make up 5 of the 14 texts included in the category. Out of the 304 references in this category 232 are from de Chauliac's texts. However, even if references in these texts are disregarded, the overall frequency of all references in category 1 is 5.27 (72), which still notably higher than in any other category.

The differences between the remaining three categories are smaller. Surgical texts are followed by verse (category 4) with 3.88. The frequency of references in specialized texts (category 2) is 3.55, and in remedies and *materia medica* (category 3) 2.22. Remedies and *materia medica* (category 3) have a slightly lower frequency of references than the other two, as well as the lowest

frequency of affirming ones, but also this category has clearly more affirming than critical or neutral references. Specialized texts (category 2) and verse (category 4) only have affirming references. The frequency of affirming references (7.89) in the whole corpus is notably higher than the overall frequency of critical (0.15) and neutral (0.34) references.

Affirming references to ancient authorities are used to legitimise factual claims as well as to justify certain treatments or diagnoses over others. In example 1 Guy de Chauliac cites Avicenna as the source for the number of muscles in the human body, and in example 2 Henry Daniel bases his description of arteries on the authority of Galen:

> (1) Alle muscles beþ 531, after **Auicen** in þe firste book, of anothomye of muscles.
>
> [There are all in all 531 muscles, after Avicenna in the first book, of anatomy and muscles.]
>
> (c.1425 de Chauliac *Cyrurgie*)

> (2) Arteriis, as sais **Galien** in hys Buk of Anothomiis, are certen veynes be þe whylk þe hert is tyed & knyt to þe longys & drawes to hyt eyre be þe pypys of þe longys.
>
> [Arteries, as says Galen, in his Book of Anatomy, are certain veins which the heart is tied to & knit to the lungs & draw air to it from the pipes of the lungs.]
>
> (1379 Daniel *Liber Uricrisiarum* 2)

In example 3 Lanfranc cites Avicenna and Galen to give authority to the use of oils, and in example 4 Henry Daniel explains the diagnostic value of urine with a reference to Galen:

> (3) And 3if men make obiectioun a3eyns me by constantine oþere ellys by hym, þat seyth þat by alle oure myght we enchewyn þat neþere oyle ne non vncomys þynge falle no3t withynne þe brayn-panne, I answere with **Avecene**, þat seyth: þat he wircheþ ry3tfulliche þat vsith certeyne oyles, & þe same telliþ **galien** & serapion
>
> [And if men make objections against me by Constantine, or others like him, that say that by all our might we eschew that nether oil, there is nothing more unseemly, it falls not within the brainpan, I answer with Avicenna, that says: that he works rightfully that uses certain oils & the same is told by Galen and Serapion.]
>
> (c.1420 Lanfranc *Chirurgia Magna* 2)

> (4) For **Galyen** sayes opon **Ypocras'** Empidiis þat yef þe seik mak blak uryn in þe begynnynge of hys malady & inward in þe malady als, & with dredfull taknys, not forþan he sall scap, 3if it sa be þat he have of kynd & esy of wynde.

> [For Galen says upon Hippocrates' *Empidiis* that if the sick make dark urine in the beginning of his malady & also during the malady & with dreadful continence, nevertheless he shall escape, if it so be that he has kind & easy winds.]
>
> (1379 Daniel *Liber Uricrisiarum* 1)

Examples 1 and 3 are from surgical texts (category 1) and examples 2 and 4 are from specialised texts (category 2). These two categories represent the more learned end of medieval medical writing, written mostly for other professionals rather than the general public (see section 3.1. above). On the other hand, remedies and *materia medica* (category 3) and verse (category 4) represent texts aimed at a wider audience. In these categories affirming references are often paired with general advice, rather than the detailed information seen in the examples 1-4 above. In addition to advice on diet and exercise the texts in these categories discuss practical topics such as homemade remedies and how to treat wounds, and these tips are occasionally backed up with references to authorities. Example 5, from Caxton's *Gouernayle of Helthe* (category 3), quotes Galen on the importance a healthy life style, and example 6, from a verse called *Medical Treatise* (category 4), uses the name of Hippocrates alongside advice on diet:

> (5) And therfore thus sayeth **Galyen** the connynge: He sayth holsom gouernaunce is meruelous, for it maketh a man to lyue tylle he be olde, and wythout sikenes in to the laste of his elde and age.
>
> [And therefore thus says Galen the skilful: He says wholesome governance is marvellous, for it makes a man to live till he be old, and without sickness into his last years.]
>
> (1491 Caxton *Gouernayle of Helthe)*

> (6) And euere þe harder þ=t= it is.
> The better it is for sothe I wys.
> For rewe metes it is gude.
> As telles **Ipocras** w=t= milde mode.
> To fowe þ=e= stomake and þ=e= splene.
>
> [And ever the harder that it is.
> The better it is forsooth I advise.
> For rows of meals it is good.
> As tells Hippocrates with mild manner
> To purge the stomach and the spleen.]
>
> (c.1425. *Medical treatise*)

Caxton's text *Gouernayle of Helthe* (example 5) represents the new genre of medical writing that emerged in the Middle Ages: regimens and health guides. These guides grew in popularity between the 1250s and 1350s and they were written as a testament to learned doctors' superiority over other practitioners of medicine (French 2003:121, see section 3.1. above). Knowledge of the ancient sources was strongly associated with learnedness and therefore references to authorities like Avicenna, Galen and Hippocrates were likely to make the authors of these health guides seem more trustworthy to their mostly upper-class readership (*ibid*.). Medical advice written in verse (example 6) was less formal and its purpose was to ease the memorization of medical information (Taavitsainen et al. 2005, see section 3.1.). The names of important authorities like Hippocrates were part of the lore of medical history, in that they were seen as the founders of medicine, which made them fundamental to people's understanding of what medicine was and where it came from (French 2003:107; see section 2.1.).

Only 7 of the 395 references in MEMT are critical. Some of these references clearly disagree with the teachings of the ancients:

> (7) Cure of it for keping of þe drie spasme is shrewed, as saiþ **Auicen**. Neþerle3, more conuenient cure is a tyne & anoyntyng with moist oile after it, And ofte-tyme3 iteracioun of it.
>
> [Cure of it for keeping off the dry spasm is shrewd, as said Avicenna. Nevertheless, a more convenient cure is a prick & anointing with moist oil after it, and usually iteration of it.]
> (1425 de Chauliac *Wounds*)

> (8) For þou3 þat **ypocras** & **Galion** tellen þat it is nessessarie after quantite of þe boon þat is lost, an holow3 cicatrise to be alwey, neþeles wiþ þis poudre þe generacioun of þese poris may be mendid, not a litil, but ri3t myche[.]
>
> [For although Hippocrates & Galen tell that it is necessary that after a quantity of the bone is lost a hollow cicatrise will be there always, nevertheless with this powder the generation of these pores can be mended not a little but right much.]
> (c.1380 Lanfranc *Chirurgia magna* 1)

> (9) Þerfor see openly how mych commonyng haþ cure of vlcere3 with cure of wonde3 And also of aposteme3.
> Therfore wonder þu not if **G** in many place3 medled here doctrine3.

> [Therefore see openly how much in common has the cure of ulcers with the cure of wounds. And also of abscesses. Therefore do not wonder if Galen in many places meddled these doctrines.]
>
> (c.1440 de Chauliac *Anatomy*)

However, some of the critical references are less straightforward. One of the critical references criticises Hippocrates by pointing out differences between the views of Hippocrates and Galen, and while it is a critical reference to Hippocrates, it is also an affirming reference to Galen:

> (10) And for þis said **Ipocras** 5=o= amphorismorum: A spasme aboue-comyng in a wonde is mortale, no3t necessarily, bot as often-tyme3, seiþ **G** in þe Commente[.]
>
> [And for this said Hippocrates's 5th aphorism: A spasm coming from above in a wound is fatal, not necessarily, but often, says Galen in the Comments.]
>
> (1425 de Chauliac *Wounds*)

Another critical reference comes from an anecdote about Hippocrates and his eating habits, also reproduced in later texts. Here Hippocrates' unhealthy personal habits are criticised:

> (11) For I hard sey of **Ypocras** þat he kept sqwyche a maner of dyete þat hys body semte febyl and i-weykyd þer-of, qwerfor hys dyscypyl seyd to hym, þat if he wold ete wele hys body schuld no3t be so febyl[.]
>
> [For I hard say of Hippocrates that he kept such a manner of diet that his body seemed feeble and weakened thereof, wherefore his disciple said to him that if he would eat well his body should not be so feeble.]
>
> (c.1422-1460 de Caritate *The Priuyte of Priuyteis*)

However, the anecdote then moves on to point out that this in fact proves Hippocrates' teachings about diet and its effects on a person's life span:

> (12) To home **Ypocras** ansquerd, 'Sone, I wul ete on sqwyche wyse þat I may lyue, and no3t lyue forte ete, puttyng my lust in etyng rather þan in longe lyuyng'.
>
> [To whom Hippocrates answered, 'Son, I would eat in such fashion that I may live, and not live to eat, putting my lust in eating rather than in living long.]
>
> (c.1422-1460 de Caritate *The Priuyte of Priuyteis*)

Critical references are not only rare but they are also distributed unevenly. Categories 2 and 4 have no critical references at all, and category 3 only has one, which is the anecdote from Johannes de Caritate's *The Priuyte of Priuyteis* discussed above. In addition to the one critical reference de Caritate's text makes two affirming references to Hippocrates. The remaining critical references are

all from two writers in category 1: Guy de Chauliac and Lanfranc of Milan. Lanfranc makes all in all 46 references to the authorities included in this study, out of which only two are critical. De Chauliac makes all in all 232 references, out of which four are critical. To sum up, overall only three writers in the whole corpus make any critical references to Avicenna, Hippocrates or Galen, and they all also make considerably more affirming references.

The neutral references mirror the distribution of critical references. There are all in all 14 neutral references in category 1, two of which are by Lanfranc and the remaining 12 by de Chauliac. The two neutral references in category 3 are from the same text, *Antidotarium Nicholai*. The neutral references point out issues of terminology and the history behind the names of remedies:

> (13) Wonde, forsoþ, and vlcere ar one same þing in grece translacioun.
> In arabice þai ar different.
> And for certayn. grece translacion said better, ffor after **G** 4.=o=
> Cerapeutice Of wonde3 or of ulcere3 was 2. most difference3.
>
> [Wounds, forsooth, and ulcers, are one and same thing in Greek translation. In Arabic they are different. And for certain Greek translation is better, for after Galen's 4th Therapeutics of wounds or of ulcers, there are at most 2 differences.]
>
> (c.1440 de Chauliac *Anatomy*)

> (14) [}PIGRA GALIENI.}] Pigra, þat ys to sey, butre. Galieni, for **Galyen** yt compowned.
>
> [Pigra, that is to say, butter of Galen, for Galen it compounded.]
>
> (c.1400-1500 *Antidotarium Nicholai*)

There are also neutral references that discuss different views of different authorities, without taking the side of either:

> (15) Nyh þe whiche þe veynes passen þe whiche, as **Lamfranque** saiþ, beren a partie of þe mater of sparme to þe gendrynge stones, þe whiche if þay be kutte, þe gendrynge is lost. Of þe whiche **Galien** holdeþ þe contrarie, as **Auicen** reherseth in þe book of blood laste.

> [Near these veins cross the ones, as Lanfranc says, that have a part in carrying sperm to the testicles, and if these be cut, the procreation is lost. Of which Galen holds the contrary, as Avicenna describes in the last book of blood.]
>
> (c.1425 de Chauliac *Cyrurgie*)

Examples 13 and 15 are from surgical texts (category 1) and example 14 is from remedies and *materia medica* (category 3). There are no neutral references in specialized texts (category 2) or verse (category 4).

6.1.2. Specificity in MEMT

Whereas the categories are fairly similar in terms of the tone of references, when it comes to specificity there are more clear-cut differences. In the present study references are analysed as specific if they mention a particular work of the authority alongside the name (see section 5.2. above). The following table illustrates the distribution of specific and not specific references in the four categories. These numbers again include references to all three authorities studied here.

Table 3. Specificity of references in MEMT by category, N/10,000 words (raw figures

Category	**Specific**	**Not specific**	**All references**
1. Surgical texts	12.23 (167)	10.03 (137)	22.27 (304)
2. Specialized texts	1.26 (11)	2.29 (20)	3.55 (31)
3. Remedies and *materia medica*	-	2.22 (48)	2.22 (48)
4. Verse	-	3.83 (12)	3.83 (12)
Total (all categories)	3.78 (178)	4.60 (217)	8.38 (395)

References in all categories except surgical texts tend to be not specific, and categories 3 and 4 do not have any specific references. This division of specific references between the categories suggests that specific references were part of the style of more learned texts, which might be the reason why surgical texts, under more pressure to appear learned, have more specific than not specific references.

The specificity of the references does not seem to be influenced by their tone:

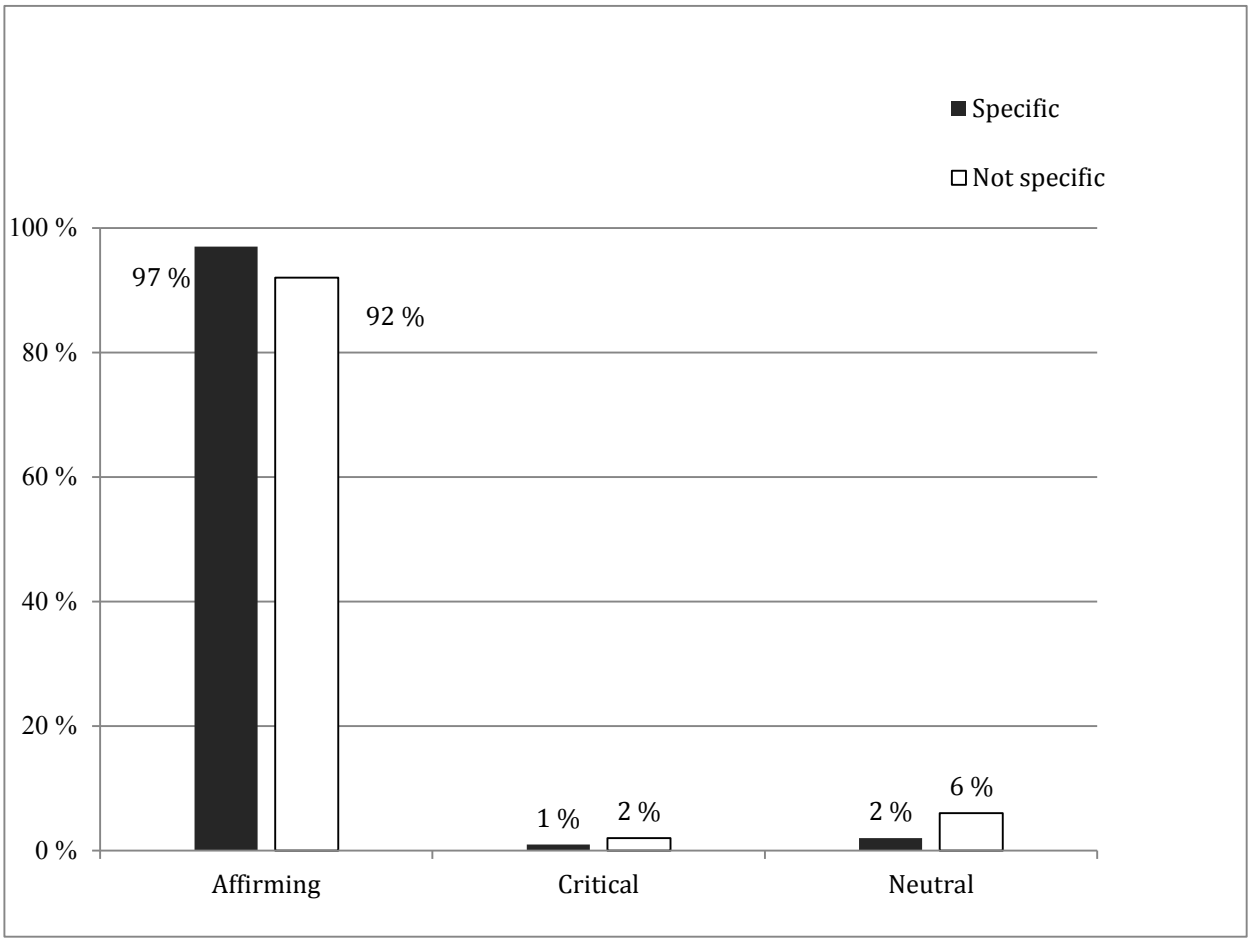


Figure 1. References in MEMT by tone and specificity (percentages)

The differences between specific and not specific references are slight. 97% of specific references and 92% of not specific references are affirming. 2% of not specific references are critical and 6% of them are neutral. Only 1% of specific references are critical and 2% neutral. Critical and neutral references seem to be therefore more often not specific than specific, but the numbers of these references are so low overall that it is not possible to come to any definite conclusions.

The specificity of the references might partially rely on the preferences of the individual authors. In most cases, however, the authors in categories 1 and 2 make both specific and not specific references. The division of specific and not specific references in individual texts can be seen in the following two tables:

Table 4. Specificity of references in category 1, raw figures (percentages)

Category 1: Surgical texts	**Specific**	**Not specific**	**All references**
Arderne, *Fistula*	-	4 (100%)	4
Arderne, *Clysters*	1 (25%)	3 (75%)	4
De Chauliac, *Anatomy*	54 (73%)	20 (27%)	74
De Chauliac, *Anatomy* (interpolated)	39 (93%)	3 (7%)	42
De Chauliac, *Cyrurgie*	35 (78%)	10 (22%)	45
De Chauliac *Ulcers*	10 (24%)	31 (76%)	41
De Chauliac, *Wounds*	12 (40%)	18 (60%)	30
Chirurgie de 1392	6 (55%)	5 (45%)	11
Lanfranc, *Chirurgia Magna* 1	4 (11%)	31 (89%)	35
Lanfranc, *Chirurgia Magna* 2	1 (10%)	9 (90%)	10
Lanfranc, *Chirurgia parva*	-	1 (100%)	1
Trevisa, *On the Properties of Things* 1	-	1 (100%)	1
Book of Surgery	3 (75%)	1 (25%)	4
Mondeville, *Chirurgie*	1 (100%)	-	1

Table 5. Specificity of references of category 2, raw figures (percentages)

Category 2: Specialized texts	**Specific**	**Not specific**	**All references**
Canutus, *Plague Treatise*	3 (75%)	1 (25%)	4
Daniel, *Liber Uricrisiarum* 1	4 (66%)	2 (34%)	6
Daniel, *Liber Uricrisiarum* 2	2 (66%)	1 (34%)	3
Phlebotomy	1 (20%)	4 (80%)	5
De Spermate	-	6 (100%)	6
Torrella, *Tretece of the Pokki*	1 (100%)	-	1
Benvenutus Grassus	-	2 (100%)	2
Bok of Ypocras of Lyf and Deyth	-	2 (100%)	2
De XII Portis	-	2 (100%)	2
When the Mone is in Aries	1 (100%)	-	1

There are some differences between authors. For example, Lanfranc's and Arderne's texts make not specific references more often than specific references, whereas de Chauliac's texts have more specific references. However, overall it seems to be fairly common to have both specific and not

specific references in the same text. Out of the 24 texts listed above 14 texts have both specific and not specific references, and only three of the texts have only specific references.

The possible reasons for making a reference specific can be seen by comparing specific and not specific references from the same text. The following two examples are from Lanfranc's *Chirurgia Magna* 1:

> (16) **GAlienus** seiþ, þat it is nessessarie a surgian to knowe anotamie; ne leeue we nou3t þat ech brood ligament is a skyn, & ech round ligament to be a senewe, so bi his opinyon he my3te falle into errour Þerfore I þenke to ordeyne a chapitle of þe kynde & of the foorme & helpinge of alle smale lymes **Auicen** seiþ knoulechinge of a þing, þat haþ cause, mai nou3t be knowen, but bi his cause.
>
> [Galen says that is necessary for a surgeon to know anatomy, so we do not falsely believe that each broad ligament is a skin & each round ligament is a sinew, so by his opinion he might fall into error. Therefore I wish to put in order a chapter of the latter & of the former kind & of relieving all small inflammations. Avicenna says knowledge of a thing that that has a cause, may not be known, but by its cause.]
>
> (c.1380 Lanfranc *Chirurgia Magna* 1)

> (17) **Galion** seiþ **in þe eende of his coment**: coold is moost greuous to a senewy lyme þat is woundid & is sore swollen; namely, & he haue þe crampe.
>
> [Galen says at the end of his comment: cold is most grievous to a sinew inflammation that is wounded & is sore, swollen; namely, & he has the cramps.]
>
> (c.1380 Lanfranc *Chirurgia Magna* 1)

In example 16 the text makes fairly general remarks, such as that according to Galen a surgeon needs to know about anatomy and that according to Avicenna understanding the causes of medical problems is vital. The references are not specific. Example 17 talks about the effects of cold on the wounded and here Lanfranc's reference to Galen is specific. The next two examples come from Canutus' *Plague Treatise*:

> (18) Wher **Avycenna** do sey that yf the man wyle slepe, he shulde drynke a draught of good wyn or he goth to slepe, for whan a man beyng aslepe, yt drawyth many humors [{and the euyl humours{] be expelled be the humors of that draught of drinke byfore.
>
> [Where Avicenna does say that if the man wants to sleep, he should drink a draught of good wine before he goes to sleep, for when a man is asleep it draws many humours,

and the evil humours will be expelled by the humours in that draught of drink he had before.]

(c.1486 Canutus *Plague Treatise*)

(19) The cause of pestilence, yt cumme be iij maner wyse, for summe tyme yt cumme of the rottys in the loer partes, and summe tyme of the rottys of the hyere partys, so that sensuali yt dow appyereth vnto vs the chyangyng of the aer, and summe tyme yt cumme of bothe, as for to say of the vpper rotte & the loer togiders.

--

And atte rotte aboue: hyt haþe the vertue of the celestial bodyes, the whiche þe spirite animal be corrumped in hymselff, and of this speke **Avicenna, the iiij=te= boke**. Be the forme of the ffyrmament lyttelly the bodyes be enffect, ffor the impression of the ffyrmament the aer douth corrumpe, and so the spirite be enffecte in man, and of thys seyde **Avicenna** in **the iiij=te= boke**.

[The cause of pestilence, it comes in three forms, for sometimes it comes from the conditions in the lower parts, and sometimes from the conditions in the higher parts, so that it sensuously appears to us in the changing of the air, and sometimes it comes in both forms, that is to say with the upper & lower conditions together.

--

As for conditions from above: it has the virtue of the celestial bodies, the spirit animal of which is corrupted himself, and of this spoke Avicenna in the 5th book. If the form of the firmament is little the bodies will be infected, because the impression of the firmament does corrupt the air and so the spirit will infect the man, and this said Avicenna in the 5th book.]

(c.1486 Canutus *Plague Treatise*)

Example 18 talks about why drinking wine before bed is beneficial and the reference to Avicenna is not specific. Example 19, on the other hand, discusses the astrological theory of corrupted air and the references to Avicenna are specific. The last pair of examples compared here comes from de Chauliac's *Wounds*:

(20) And þat sych diete be proffitable to wonded men; it is proued þus.

ffor-why it manteneþ vertue, it moueþ not febre ne aposteme3, ne it styreþ not emorogie3, & it preperateþ conuenient nutriment in conuenient tyme; þis maner is sich, þerfor it is proffitable. And for-þi þer commendeþ it **G.**, Rasis, haly Abbas**, Auicen**, Brunus, william & lamfranc.

[And that such diet is profitable to wounded men, it is proved thus.

Because it maintains energy, it does not worsen fever or abscesses, nor does it stir haemorrhoids, & it gives convenient nourishment at convenient times; its manner is such, therefore it is profitable. And for this is it commended by Galen, Rasis, Haly Abbas, Avicenna, Brunus, William & Lanfranc.]

(1425 de Chauliac *Wounds*)

(21) Of nerue3 & veyne3 seiþ **Auicen** bi auctorite of **G** in **5=o= cerapeutice** þat þai haþ hem in mene maner after þat þai ar mene atuix hardne3 and softene3, Wherfor þai ar incarnate when þe kuttyng is litil & þe body moiste. And þai ar not incarnate in adiuersed fro þis. Wherfor seiþ **G vbi supra**:

It semeþ, forsoþ, experience for to witne3 to reson. In enfante3, forsoþ, & in wymmen y haue sene an arterie consolded for moistne3 & softnes of þe body And in a 3ong man hauyng a short or litel diuision .i. kuttyng. And þis is confermed by þe auctorite of **Ipocras** in **6. =o= amphorismorum**.

[Of nerves & veins said Avicenna by the authority of Galen in the 5th part of Therapeutics that their condition is intermediate because they are between hardness and softness. Wherefore they close up when the cutting is moderate & the body is moist. And they do not heal adversely after this. Wherefore said Galen *ubi supra*:

It seems, forsooth, that experience is a witness to reason. In children, forsooth, & in women I have seen an artery healed by the moistness & softness of the body. And in young man having a short or little severance after first cutting. And this is confirmed by the authority of Hippocrates in the 6th aphorism.]

(1425 de Chauliac *Wounds*)

Example 20 discusses why a certain diet is suitable for the wounded, and the references to Galen and Avicenna are not specific. In example 21, specific references to Avicenna, Galen and Hippocrates are used to explain why cutting a vein is safe. Looking at these examples it seems that the specificity of the references might be influenced by how established and well known the claims they support are. More detailed accounts, such as the information on veins in example 21, are often backed up with specific references, while generally known information is more often paired with a not specific reference, such as the advice to surgeons in example 16 or the recommended sleeping habits in example 18. Furthermore, if the text discusses something that might be disputable and not generally agreed upon, there is reason to be more specific about where the information comes from,

as seen in example 22, which discusses the number of bones protecting the human brain as well as which bones should be counted as the bones of the head:

> (22) So þat þer ben vij bones of þe braine panne, and so þei be noumberde in dede mennes heuedes, þe whiche ben soþen & diuidid wiþ boilinge water.
>
> Also **galien** noumberþ hem in þe same maner **in þe .20. chapiter of þe elleuenþe boke de vtilitate particulari**, wher-fore it semeþ wele þat Willelmus de Saliceto and lamfrank and henricus de hermondavilla also sawe euel her anothomie, for þei seien þat os passulare is vnder þe bone þat is cleped lauda, and þat is one off þe bones of þe necke. And þei seien also þat þe bones þat ben cleped petrosa ben added vppon þe bones þat ben cleped parietalia & þat þei touche not þe brayne, neiþer þat [{þei{] ben enye of þe principal bones; but þe contrarie þer-off is soþe. And þerfore it foloweþ þat þer ben vij. principal bones þe whiche contenen þe braine -- .
>
> [There are 7 bones in the brainpan, and so they have been numbered in dead men's heads, which have been examined & divided with boiling water.
>
> Also Galen numbered them in the same way in the 20th chapter of the eleventh book *De Utilitate Particulari*, wherefore it seems appropriate that Guilielmus de Saliceto, Lanfranc, as well as Henricus de Hermondavilla criticised his anatomy, for they said that *os passulare* is under the bone that is called *lauda*, and that is one of the bones of the neck. And they also said that the bones that are called *petros* have been added to the bones that are called *parietalia* & that they do not touch the brain, nor are they part of the principal bones; but the contrary has been discovered. And therefore it follows that there are 7 principal bones which surround the brain -- .]
>
> (c.1425 de Chauliac *Anatomy*, interpolated)

However, not all not specific references relate to general information, and not all specific references are attached to more advanced knowledge. Example 23 below discusses veins and arteries in detail but the references are not specific, and in example 24, from *Book of Surgery*, the reasons why a surgeon should know anatomy are accompanied with a specific reference to Galen.

> (23) For after þat **Avicenna**, Walter, & **Galien**, & oþer auturis also will þat as ofte tymes or as euer undir every veyne of þe bodi whech is to be mynusched is an arterie undir.
>
> [For after Avicenna, Walter, & Galen, & other authors also agree that usually, or even always, under every vein of the body which is to be bled there is an artery.]
>
> (c.1475 *Phlebotomy*)

(24) For as **galyen**e sayth and beryth wytnese on **a boke cald vtylytas particlarum** saynd that þat þe anothomie is good to know for iiij comodytes. (c.1446 *Book of Surgery*)

[For as Galen says and bears witness in a book called *Utilitas Particlarum*, he says that it is good to know anatomy because of 4 benefits.]

(c.1446 *Book of Surgery*)

It would therefore seem that specific references were not only used to inform the readers where the information had come from but also to demonstrate the author's familiarity with the writings of the ancient authorities. Moreover, as in example 23, simply the names of the authorities were sometimes deemed a specific enough source.

6.1.3. Authorities in MEMT

There are some differences between the categories as to which names the texts refer to the most. These are presented in the following table:

Table 6. References in MEMT by category and name, N/10,000 words (raw figures)

Category	***Avicenna***	***Galen***	***Hippocrates***	**All**
1. Surgical texts	6.74 (92)	13.70 (187)	1.83 (25)	22.27 (304)
2. Specialized texts	0.57 (5)	1.49 (13)	1.49 (13)	3.55 (31)
3. Remedies and *materia medica*	0.32 (7)	0.79 (17)	1.11 (24)	2.22 (48)
4. Verse	-	0.32 (1)	3.51 (11)	3.83 (12)
Total (all categories)	2.21 (104)	4.62 (218)	1.55 (73)	8.38 (395)

Overall references to Galen are clearly the most frequent, followed by Avicenna and then Hippocrates. Avicenna is mostly cited in surgical texts and the frequency of references in other categories is remarkably lower. There are no references to his name in verse. References to Galen are also more common in surgical texts than the other three categories, and Galen is mentioned in category 4 only once. Hippocrates is referenced to less frequently than Avicenna or Galen but the

references are divided more equally between the categories. Hippocrates is referred to the most in category 4 and is by far the most popular authority in this category. Hippocrates role as the de facto father of medicine (French 2003:9; see section 2.1.) might have made his name a more natural part of medical verse than Avicenna's or Galen's.

The references to the authorities are very similar in terms of tone:

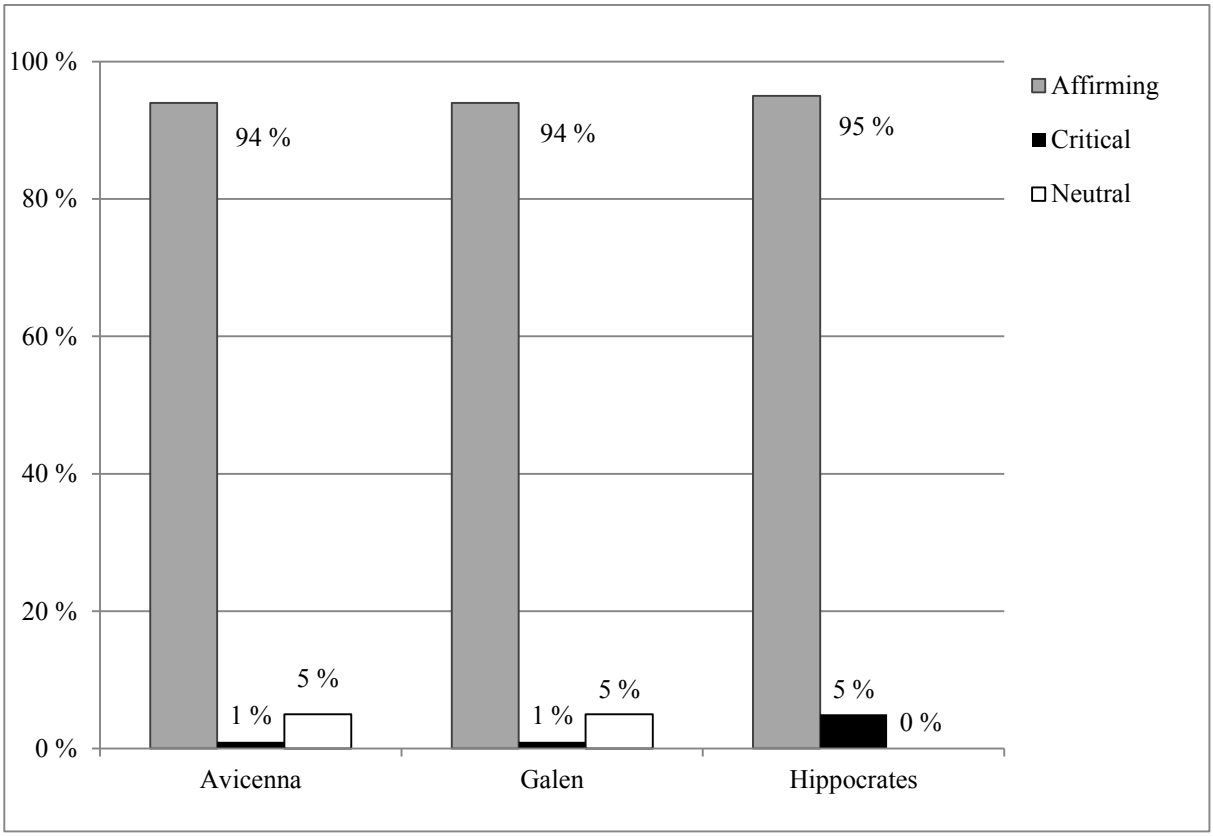


Figure 2. References in MEMT by name and tone (percentages)

References to all three names are overwhelmingly affirming. References to Avicenna and Galen are identical. Hippocrates differs from them somewhat in that there are no neutral references to his name. This difference is, however, very slight given that neutral references make up only 1% of references to Avicenna and Galen. None of the authorities are criticised more than others and only 5% of references to all three names are critical.

In terms of specificity there are some differences between the authorities:

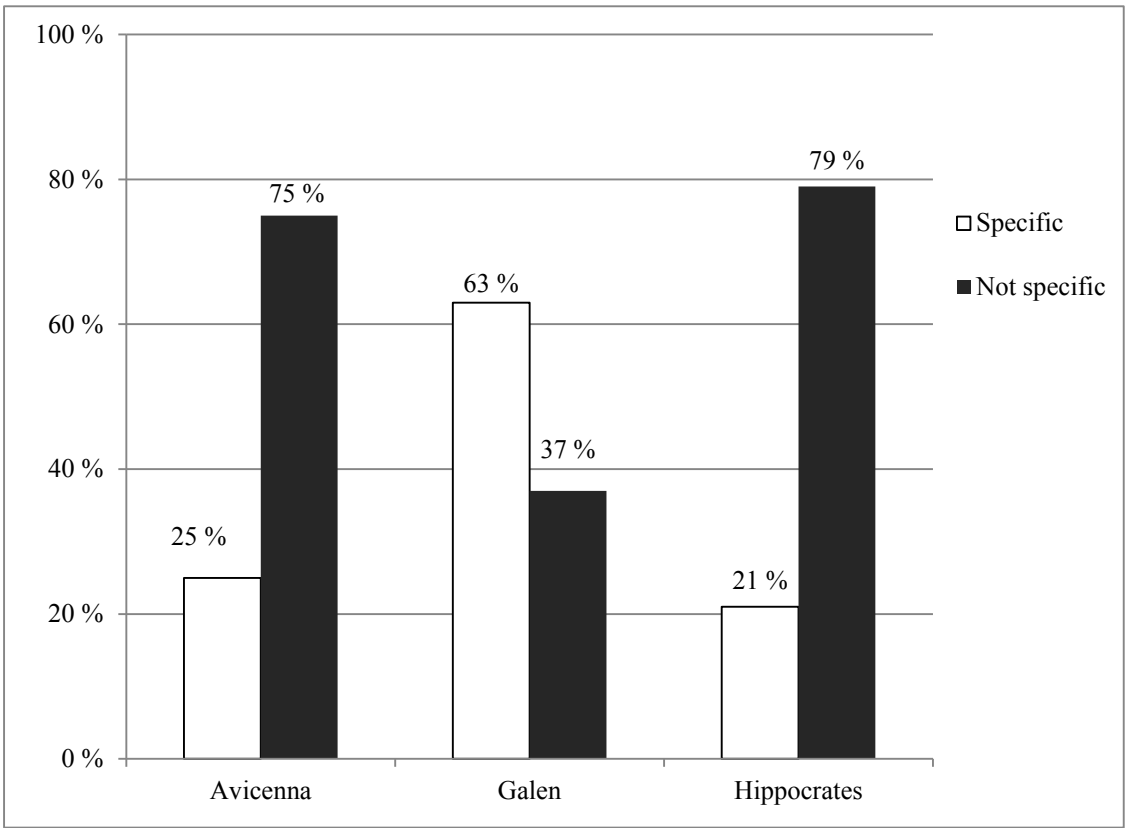


Figure 3. References in MEMT by name and specificity (percentages)

References to Avicenna and Hippocrates are very similar and the references to them are usually not specific. References to Galen, on the other hand, are more often specific than not. However, this difference is probably mostly due to the individual style of de Chauliac who makes the most references to Galen and who, as discussed above, prefers specific references in general. When de Chauliac's texts are disregarded only 26% of references to Galen are specific and 74% not specific, making references to him similar to the others.

6.2. EMEMT categories

6.2.1. Tone in EMEMT

During the early modern period the number of medical texts written in English increased rapidly and vernacular texts also became more diverse (Taavitsainen 2010:52; see section 3.2. above). While the traditional writing conventions established in the Middle Ages did continue well into the early modern period, the changes in natural philosophy altered the way people understood scientific

knowledge and this had a fundamental effect on medicine as well (Wear 2000:364; 3.1. above). Whereas the references in medieval medical texts are overwhelmingly affirming (section 6.1. above), the results from EMEMT show more variation between the categories, as seen in the following table. As the difference between MEMT and EMEMT seems to be diachronic in nature, it is likely that the tone of references continued to change throughout the early modern period, which creates variation within the categories of EMEMT. The numbers in this table include references to all three names (*Avicenna*, *Hippocrates* and *Galen*).

Table 7. Tone of references in EMEMT, N/10,000 words (raw figures)

Category	**Affirming**	**Critical**	**Neutral**	**All**
1. General treatises and textbooks	4.71 (84)	0.62 (11)	0.84 (15)	6.17 (110)
2a. Specific diseases	4.81 (74)	0.58 (9)	2.08 (32)	7.47 (115)
2b. Specific methods	5.67 (94)	0.78 (13)	0.78 (13)	7.24 (120)
2c. Specific therapeutic substances	10.53 (128)	1.07 (13)	4.61 (56)	16.21 (197)
2d. Midwifery and children's diseases	9.04 (93)	1.26 (13)	0.49 (5)	10.78 (111)
2e. Plague	6.93 (44)	0.47 (3)	1.26 (8)	8.67 (55)
3. Recipe collections and *materia medica*	1.05 (46)	0.14 (6)	0.25 (11)	1.44 (63)
4. Regimens and health guides	9.54 (199)	0.81 (17)	1.49 (31)	11.84 (247)
5. Surgical and anatomical treatises	8.0 (241)	0.83 (25)	2.09 (63)	10.90 (329)
6. *Philosophical transactions*	0.23 (4)	0.35 (6)	0.29 (5)	0.88 (15)
Total (all categories)	5.28 (1,007)	0.61 (116)	1.25 (239)	7.15 (1,362)

The general trend in the whole corpus and the majority of the categories, from most to least frequent tone, is *affirming* > *neutral* > *critical*. There are, however, two exceptions. Specialised texts on midwifery and children's diseases (category 2d) have more critical references than neutral ones and this category also has the highest frequency of critical references out of all the categories. The

critical references in this category, however, come mostly from one author, Nicholas Culpeper, who especially criticises the teachings of Galen:

> (25) These two Lateral or side-Ligaments of the Yard, where they are thick and round, spring from the lower part of the Share bone, and not from the upper part, as **Galen** dreamed, at their begining they are separated the one from the other, and resemble a pair of Horns, or the letter Y; where the Urethra or common channel of Urin and Seed passeth between them. (1651 Culpeper *Directory For Midwives*)

> (26) -- for indeed and in truth, **Galen** never saw a Man nor Woman dissected in his life time, it being accounted abominable in his time to use such supposed cruelty upon a dead Corps, and therefore he dissected only Apes, which was the cause he wrote such [an] Apish Anatomy. (1651 Culpeper *Directory For Midwives*)

Out of the 13 critical references in this category 9 are from Culpeper's text *Directory For Midwives* (1651). Other texts in this category have more affirming references than critical ones.

The other exception is the journal *Philosophical transactions* (category 6), published by the Royal Society from 1665 onwards (see section 5.1. above). In this category the trend is completely reversed, with critical references being the most and affirming references the least frequent. The articles in this journal represent the highest end of scientific discourse in early modern England and therefore they were also the first to react to the changes of the period (Taavitsainen 2010:50-51). As seen in example 27, relying solely on previous authorities was in fact openly criticised:

> (27) The Romans (tho' extreamly civiliz'd) thought it Honour enough to Transcribe, or Epitomize the Greeks; Scribonius Largus, Celsus, and Pliny were only Copists. **Hippocrates**, Aristotle, Theophrastus, Dioscorides, &c. Originals; which **Galen** afterwards did indeed refine upon, but the Latines invented little or nothing. (1693 *Philosophical Transactions*, volume 17, number 204, pp. 925-35)

Philosophical transactions represents a new style of early modern English medical writing which turned away from referencing authorities and emphasised the author's own empirical observations over ancient sources of knowledge (Wear 2000:358; see section 3.2. above).

Texts on specific therapeutic substances (category 2c), regimens and health guides (category 4), texts on midwifery (category 2d) and surgical treatises (category 5) all have a high

frequency of affirming references. 16th century texts concerning specific therapeutic substances, i.e. ingredients for remedies, were driven to rediscover the medicines used by the ancients (Pahta and Ratia 2010:89), as can be seen in examples 28 and 29:

> (28) **Galen** sometimes did mingle metalls togithers beaten in Uinagre [decanter] in the forme (as before hath been said) and by that meanes the medicine was made more sharp, euen as though he had put in Uerdegrece [verdigris]. (1574 Baker *Oleum Magistrale*)

> (29) I thought best in this place to expresse y=e= same, as I doe finde it in **Galen**, in 2. de Antid. and is in many antidotary bookes allowed, which is as foloweth. (1585 Bailey *Mithridatium*)

Regimens and health guides have their roots in medieval medical writing (see 6.1. above) and they changed hardly at all during the early modern period (Suhr 2010:117-118). Therefore frequent references to ancient authorities remain common:

> (30) The thirde is eatynge of apples: whiche as **Auicen** saythe (.ij. can~. cap. j.) to eate often and moche cause ache of the senowes. (1528 de Mediolano *Regimen Sanitatis Salerni*)

> (31) **Hippocrates** giueth counsell that men should not mingle medicins with meate, but to take them three or foure hours before meat, or else so long after. (1595 Bullein *Gouernement Of Health*)

As noted above, texts on midwifery and children's diseases have the highest frequency of critical references out of all the categories, and they also have a high frequency of affirming references. This category has a mixture of both traditional learned medical writing and texts influenced by the new 16th century discoveries in anatomy (Pahta and Ratia 2010:93-94), which explains the relatively high frequencies of both affirming and critical references. Early modern surgical treatises, on the other hand, are fairly similar to their medieval counterparts (Tyrkkö 2010:214-215). Writers of surgical texts continued to stress the learnedness of surgery (Wear 2000:221-222, see section 3.2. above) and references to authorities like Avicenna and Galen emphasised the craft's noble and ancient origins.

According to Taavitsainen references also gained a new function in the early modern period, which was to give texts "an aura of learnedness" (2009:50; see section 3.3. above). These

references are not used to back up factual claims or to justify certain diagnoses or treatments. Rather, their purpose is to emphasise the academic quality of these texts and, by extension, the learnedness of their authors. In this study these cases were analysed as neutral (see 5.2. above for more details). These seem to be especially prominent in surgical texts (examples 32 and 33) and regimens and health guides (examples 34 and 35):

> (32) The noble experyence of the vertuous handy warke of surgeri/ practysyd & compyled by the moost experte mayster -- the olde doctours and maysters very experte in the seyence of Surgery/ As **Galienus**/ **Ipocras**/ **Auicenna**/ Gwydo/ Haly abbas/ Lancfrancus of mylen/ Iamericus/ Rogerius/ Albucasis/ Place~tinus/ Brunus/ Gwilhelmus de saliceto/ & by many other maysters whose names be wryten in this same boke. (1525 Braunschweig *Handy Warke Of Surgeri*)

> (33) If you aske who did of old practice it [surgery]? you shall find that either they were numbred amongst the gods, or were renowned persons, called heroes, as Hercules, Chiron, Achilles, or men of eminent learning and worth, as **Hippocrates**, **Galen**, **Avicen**, and sundry others[.] (1650 Read *Workes Of That Famous Physitian*)

> (34) All the resydue concerninge thinges naturall, conteyned in the Introduction of Ioannicius, and in the lyttell crafte of **Galene**, I pourposely passe ouer for this tyme, for asmoche as it dothe requyre a reder hauynge some knowlege in philosophye naturall, or els it is to harde and tedyouse to be vnderstande. (1541 Elyot *Castel Of Helth*)

> (35) Then came **Galen**, not vnknowne to all wise and learned Phisitions. I coulde rehearse manie moe, but this shall suffise to prooue Phisicke to bee of greate authoritie amongst the olde fathers. (1595 Bullein *Gouernement Of Health*)

As discussed above, writers of surgical texts continued to be under pressure to appear learned and therefore these kind of references seem to be a natural part of their style. Regimens and health guides, on the other hand, aimed to be impressive to the lay audience rather than other medical experts, and the writers of these guides emphasised their learnedness in an effort to stand out from practitioners of popular medicine (Wear 2000:58; see 3.1. above). Neutral references also continued to be used in the ways discussed in connection with medieval medical texts above (section 6.1.), as seen in the following examples:

> (36) Lycanthropia, which **Avicenna** calles Cucubuth, others Lupinam insaniam, or Woolfe madnesse, when men runne howling about graues and fields in the night, and

> will not be perswaded but that they are Wolues, or some such beasts. (1621 Burton *Anatomy of Melancholy*)

> (37) And in the choyce of fleshes the phisitians agree nat. For **Galen** and certeyne other say/ that porke is best. Some other/ as **Auicen**/ Rasis/ and Auerreoys say/ that kyddis fleshe [young goat meat] is beste. (1528 de Mediolano *Regimen Sanitatis Salerni*)

In example 36 the discussion is one of terminology, and example 37 reports the differing views of different authorities without explicitly agreeing or disagreeing with any of them.

There are also notable differences between the categories as to how frequently the texts make references to the three names overall:

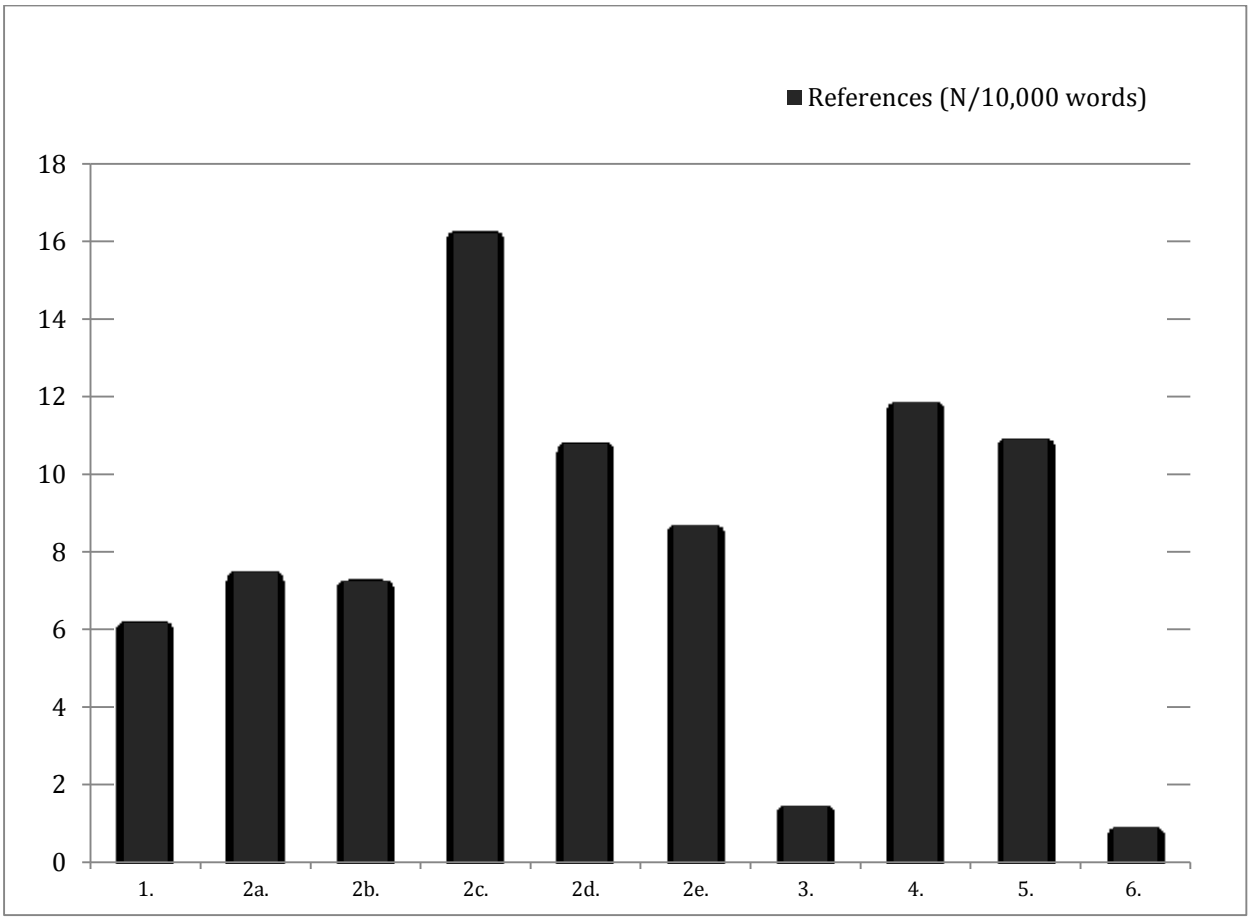


Figure 4. References in EMEMT by category

Texts on specific therapeutic substances (category 2c) have the highest frequency of references. References are also very frequent in regimens and health guides (category 4), surgical texts (category 5) and texts on midwifery and children's diseases (category 2d). Recipe collections and

materia medica (category 3) and *Philosophical transactions* (category 6) make clearly fewer references than the other categories. Recipe collections and *materia medica* (category 3) consist mostly of straightforward instructions on how to prepare medicines and have by nature very little discussion (Marttila 2010:108), which makes references to ancient authorities less prominent. The articles in *Philosophical transactions* (category 6), as discussed above, represent the newest developments of early modern medical writing and this is reflected by the low frequency of references to ancient authorities. All in all, in terms of the number and the tone of references, texts on specific therapeutic substances (category 2c), regimens and health guides (category 4) and surgical treatises (category 5) seem to be the most conservative of the categories.

6.2.2. Specificity in EMEMT

Most categories have almost an equal amount of specific and not specific references, as seen in the following table. Again, these numbers include references to all three names studied here.

Table 8. *Specificity of references in EMEMT, N/10,000 words (raw figures)*

Category	**Specific**	**Not specific**	**All**
1. General treatises and textbooks	1.23 (22)	4.93 (88)	6.17 (110)
2a. Specific diseases	3.51 (54)	3.96 (61)	7.47 (115)
2b. Specific methods	3.86 (64)	3.38 (56)	7.24 (120)
2c. Specific therapeutic substances	7.41 (90)	8.80 (107)	16.21 (197)
2d. Midwifery and children's diseases	5.05 (52)	5.73 (59)	10.78 (111)
2e. Plague	5.36 (34)	3.31 (21)	8.67 (55)
3. Recipe collections and *materia medica*	0.11 (5)	1.32 (58)	1.44 (63)
4. Regimens and health guides	5.94 (124)	5.90 (123)	11.84 (247)
5. Surgical and anatomical treatises	4.74 (143)	6.17 (186)	10.90 (329)
6. *Philosophical transactions*	0.06 (1)	0.82 (14)	0.88 (15)
Total (all categories)	3.10 (589)	4.06 (773)	7.15 (1,362)

Although overall specific and not specific references are spread fairly evenly, there are some exceptions. General treatises and textbooks (category 1), recipe collections and *materia medica*

(category 3) and *Philosophical transactions* (category 6) have clearly more not specific than specific references. In addition, not specific references are also slightly more frequent in surgical texts (category 5). By contrast, texts on plague (category 2e) have more specific references than not specific ones.

The four categories that have fewer specific references represent different types of medical writing. General treatises and textbooks are mostly written by and for medical practitioners, with some texts aimed at lay audiences (Taavitsainen and Tyrkkö 2010:66). Although there are exceptions, well-established knowledge tends to be accompanied with references that are not specific, as discussed above in connection with medieval medical writing (section 6.1.), whereas specific references occur more often with advanced knowledge and theoretical discussion. This can be seen, for instance, in Christopher Langton's *Uery brefe treatise*, which has both specific (example 38) and not specific references (example 39):

> (38) -- wherfore an element, (as **Galen** sayeth in **the .viii. boke of the decrees** of Plato, and Hyppocrates) is the lest part of that thynge, of the which it is an element, and of these amongest the hole nature of thynges, there be but fower in number, which is the fyer, Ayer, water, and yearth (1547 Langton *Uery brefe treatise*)

> (39) EUery softe mouynge, is not an exercise, as **Gallen** sayeth, but y~ that is su~thing vehement, as lepyng, coytyng, runnyng, tennys, footbale, shootyng, and such lyke (1547 Langton *Uery brefe treatise*)

Textbooks that aim to give an introduction to the medical practice are less likely to have theoretical discussions about uncertainties and the grey areas of medical knowledge, which might explain the low frequency of specific references in this category. Recipe collections and *materia medica*, aimed at and read by very heterogeneous audiences from lay people to professionals, also have very little theory, and the references are often not specific:

> (40) It is very good to help digestion, and open obstructions of the brain; and hath so much purging quality in it (saith **Avicen**) as to expell those melancholly vapours from the spirits and bloud which are in the heart and arteries, although it cannot do so in other parts of the body. (1652 Culpeper *English Physician*)

The specific references in this category are mostly discussions of whether or not the ancient authorities used certain remedies (example 41) and whether or not contemporary physicians use them correctly (example 42):

> (41) It is thought to be that Tarchon which **Auicen** mentioneth in **his 686. chapter**: but he writeth so little thereof, as that nothing can certainly be affirmed of it. Simeon Sethi the Greeke also maketh mention of Tarchon. (1633 Gerard and Johnson *Generall Historie Of Plantes*)

> (42) And here is to be marked that they are farre deceiued that vse this for po~tike wormwod. I report me to **Galene (xi. Methodi medendi)** whether it be so or no. Pontike wormwod, is hote in the fyrste degree and dry in the thirde. Sea wormwod is hote in the seconde degree and dry in the fyrste, frenche wormwod is weaker then Sea wormwod is. (1548 Turner *Names Of Herbes*)

Surgical texts also have slightly fewer specific than not specific references, which might be caused by the instructive nature of some texts in this category, as instructions on how to perform surgery are less likely to include theoretical discussion.

The articles in *Philosophical transactions*, by contrast, have an abundance of theoretical discussion on a variety of topics and they report on new experiments rather than well-established knowledge (Hiltunen 2010:130). This category, however, only has one specific reference. The reference comes from an article that discusses the merits of a French study on fertilisation:

> (43) What Doctor Kerkring, (saith one of them) hath from his curious Observations advanced, viz. That man hath his origin from an Egg, hath been very differently received, some appearing surprised at it, others rallying with it, and many being induced thereby to make further inquiry into it.
> --
> It is also certain, that after conception, that which encloseth the Fœtus, is almost like an Egg; but this is not new neither, seeing that **Hippocrates** hath observed it **lib. de natura puer** [.] (1672 *Philosophical Transactions*, volume 7, number 81, pp. 4018-26).

The specific reference to Hippocrates is used here to point out that the discoveries in this study are not new. Mentioning specific texts of ancient authorities was part of the style of traditional learned medical writing (see 3.3. above), and therefore they are glaringly absent from the articles that represent new kind of medical texts.

Plague treatises (category 2e) is the only category in the corpus that has notably more specific than not specific references. The several outbreaks of bubonic plague in the early modern period posed a threat to learned medicine because the cures it had to offer were obviously ineffective against the disease (Wear 2000:277; section 2.2. above). This fuelled scepticism against humoral medicine and the plague began to be discussed in terms of the new natural philosophy (Wear 2000:305-306). In an effort to defend their branch of medicine, learned writers of plague treatises examine the writings of ancient authorities very carefully, as can be seen from the following examples:

> (44) But than thou mayst meue against me, and say that if so were y=t= the venemous ayre, and the corrupcion therof, should be cause of pestilence, or elles man, woma~ and chyld shuld be infect thereby, that it semeth euery man, woman, & chylde, should be infect & corrupt by the pestilence. In the cou~trey there the ayre corrupt is reignyng, sythen the ayre in such a place is common to all maner of me~.
>
> To this aunswered **Auicen in his ca~non in the part there he treteth De cura februm**: that if al the pestylence ayre be reygnyng in a countrey, and if it be common to all the inhabitau~tes of that country, yet there shall none be infect there with, but they y=t= be replet and ful of corrupt humours the whiche corrupte humours haue their respect and accordyng to receyue the corrupcion and the venym of the ayre els in what contrey, or city that such ayre were corrupt or venomed. (1539 Moulton *Myrrour Or Glasse Of Helth, Plague*)
>
> (45) And **Galen (in 1. de Temperam. c. 4.)** affirmeth, that the hot and moyst constitution of the ayre, doth most of all breed pestilent diseases. And from these mouthes, a multitude of late Writers have learnt to speake the same thing. Yet we know that the hot and dry weather also, may cause a contagious ayre. So saith Avenzoar in his 3. Booke, 3. Tract. and 1. chap. And Titus Livius (in lib. 1. decad. 4.) recordeth, that Rome was infected with the Plague by a Hot and Dry distemper of the Aire. (1636 Bradwell *Physick For The Plagve*)
>
> (46) To his effect before his time, the great M. of Physique, **Hipocrates** writeth thus, **in his Booke Of Humane Nature**: The cause (saith he) of the generall pestilence which indifferently attainteth all sortes of men, is the ayre which we sucke, that hath in it selfe a corrupt and venemous seede, which we draw with our in-breathing. (1603 Lodge *Treatise Of The Plague*)

As a result the frequency of specific references is high in this category. Although the new chemical terminology was largely adapted to describe the plague, early modern plague treatises also retained

features of their medieval counterparts, such as including general advice on how to prevent illnesses (Pahta and Ratia 2010:99).

6.2.3. Authorities in EMEMT

Out of the three authorities studied here, Galen is referred to most frequently:

Table 9. References in EMEMT by name, N/10,000 words (raw figures)

Category	***Avicenna***	***Hippocrates***	***Galen***	**All**
1. General treatises and textbooks	0.84 (15)	1.40 (25)	3.92 (70)	6.17 (110)
2a. Specific diseases	0.97 (15)	1.49 (23)	5.0 (77)	7.47 (115)
2b. Specific methods	1.07 (18)	2.32 (39)	3.75 (63)	7.24 (120)
2c. Specific therapeutic substances	1.07 (13)	1.65 (20)	13.49 (164)	16.21 (197)
2d. Midwifery and children's diseases	2.23 (23)	4.76 (49)	3.80 (39)	10.78 (111)
2e. Plague	1.73 (11)	2.84 (18)	4.10 (26)	8.67 (55)
3. Recipe collections and *materia medica*	0.30 (10)	0.15 (5)	1.42 (48)	1.44 (63)
4. Regimens and health guides	3.50 (73)	2.16 (45)	6.18 (129)	11.84 (247)
5. Surgical and anatomical treatises	1.77 (53)	2.68 (81)	6.46 (195)	10.90 (329)
6. *Philosophical transactions*	0.12 (2)	0.41 (7)	0.35 (6)	0.88 (15)
Total (all categories)	1.17 (233)	1.56 (312)	4.09 (817)	7.15 (1,362)

References to Avicenna are most frequent in regimens and health guides (category 4) and texts on midwifery and children's diseases (category 2d). Texts on midwifery also have the highest frequency of references to Hippocrates. In addition, references to Hippocrates are relatively frequent plague treatises (category 2e), surgical texts (category 5) and texts on specific methods (category 2b). Avicenna and Hippocrates are, however, overshadowed by Galen, who is referred to most frequently in all categories except one – *Philosophical transactions* (category 6) have one more reference to Hippocrates than Galen. References to Galen are especially frequent in texts on

specific therapeutic substances (category 2c), surgical treatises (category 5) and regimens and health guides (category 4).

There are no notable differences between the three names in terms of specificity, but they do differ somewhat when it comes to the tone of references:

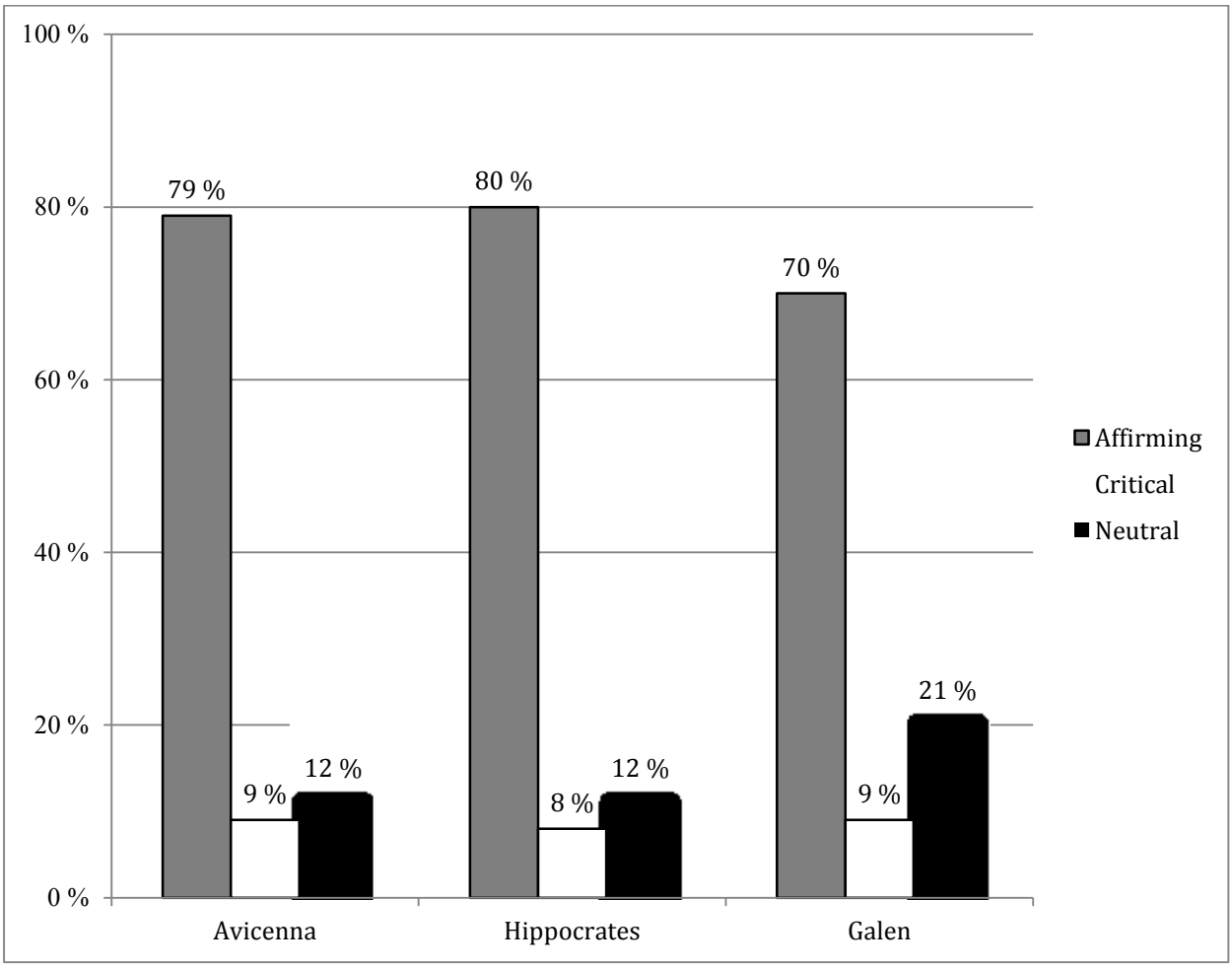


Figure 5. References in EMEMT by name and tone (percentages)

References to all three names are mostly affirming, followed then by neutral and finally by critical references. Hippocrates and Avicenna are nearly identical, whereas references to Galen are spread out slightly more between affirming and neutral. The majority of the neutral references to Galen are from texts on specific therapeutic substances (category 2c) and surgical treatises (category 5). The neutral references in these two categories make up about half of all the neutral references to Galen (83 out of 174). These references are mostly discussions of terminology (especially in category 2c)

and references that aim to make the text sound learned (especially in category 5). There are, however, also instances where Galen's authority is questioned by comparing his views to those of other authorities:

> (47) After **Lanfrankes** intention, bicause they cary the matter sparmatike [sperm] to the ballockes. And therfore if they be cut a man is neuer apt to generation. Neuerthelesse **Galen** holdeth the contrary, as **Auicen** reciteth in the treatie of the lynage. (1579 de Chauliac *Gvydos Qvestions*)

> (48) When I come to particulars, I will not only deliver the principles of Hippocrates, and **Galen**, and their sectators the Arabians. But I will acquaint you with the **Theorems of the Chymists** and compare the opinions of both, that it may be known who have been most familiarly nursed in the bosome of nature. (1650 Read *Workes Of That Famous Physitian*)

Although Galen is not outright criticised in these examples, and although explicitly critical references remain rare, reporting his teachings alongside other views shows a subtle shift in the attitudes towards him. His authority is no longer always absolute but instead he is presented as one expert among several others, some of whom disagree with him.

6.3. From the 14th to the 17th century

As can already be seen from the results discussed above, medical writing and the use of references underwent changes between the 14th and the 17th centuries. In the final part of this results section I will examine how the use of references changed over time. The texts from the two corpora are divided here into four year groups: MEMT (1375-1500), 1500-1599, 1600-1649, and 1650-1700. The first group represents medieval medical writing and the last three different stages of early modern medical writing (see section 5.2. above).

6.3.1. Tone by year group

Affirming references are the most frequent in all year groups, followed by neutral references, with critical references being the least common:

Table 10. Tone of references by year group, N/10,000 words (raw figures)

Tone	MEMT (1375-1500)	1500-1599	1600-1649	1650-1700
Affirming	7.89 (372)	8.98 (563)	6.38 (325)	1.55 (119)
Critical	0.15 (7)	0.59 (37)	0.63 (32)	0.61 (47)
Neutral	0.34 (16)	2.03 (127)	1.02 (52)	0.78 (60)
All references	8.38 (395)	11.59 (727)	8.03 (409)	2.94 (226)

There are, however, notable changes in the volume of references, which are illustrated in the following graph:

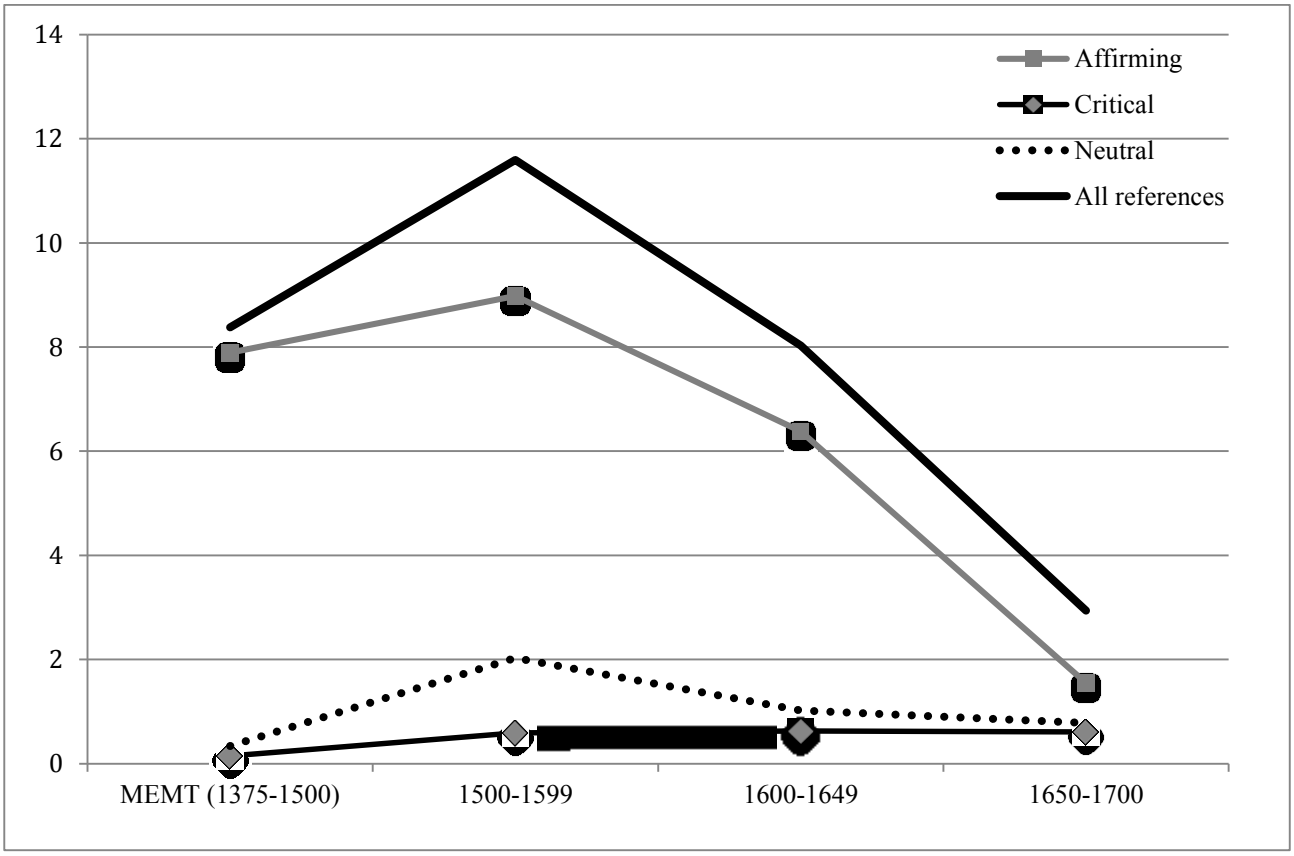


Figure 6. Tone of references by year group, N/10,000 words

The frequency of all references increases after the first year group and peaks in the 16th century, after which the frequency starts declining and drops dramatically after the first half of the 17th century. Only the frequency of critical references increases slightly after the end of the 16th century. The high frequency of references to ancient authorities in the 16th century is most likely due to the influence of Renaissance humanism and its emphasis on historical accounts of knowledge (Siraisi 2010:73-74; see 2.2. above). The 17th century, by contrast, was marked by the rise of empirical natural philosophy, the advocators of which explicitly criticised reliance on past authorities (Wear 2000:386). Medical texts seem to react to the changes especially during the last half of the 17th century. In the first half of the 1600s the frequency of all references is 8.03 and almost in level with medieval medical texts, but after the year 1649 the frequency drops to 2.94.

Affirming references are the most frequent in the 16th century (8.98), although medieval medical texts (7.89) and the first half of the 17th century (6.38) are fairly close. The latter half of the 17th century, on the other hand, has a clearly lower frequency of affirming references (1.55), although affirming references are still more frequent than neutral and critical ones in the last year group as well. Critical references are, overall, uncommon. Medieval medical texts have the lowest frequency of critical references (0.15). The frequency of critical references is the highest in 1600-1649 (0.63), followed closely by the last year group (0.61). Neutral references are also relatively rare and their frequency mirrors the curve of all references. It would seem that neutral and critical references did not replace affirming references during the early modern period but rather the 17th century medical texts dropped references to ancient authorities altogether.

6.3.2. Specificity by year group

In all but one of the year groups references are split fairly evenly into specific and not specific references:

Table 11. Specificity of references by year group, N/10,000 words (raw figures)

Specificity	MEMT (1375-1500)	1500-1599	1600-1649	1650-1700
Specific	3.78 (178)	5.01 (314)	4.44 (226)	0.64 (49)
Not specific	4.60 (217)	6.59 (413)	3.59 (183)	2.3 (177)
All references	8.38 (395)	11.59 (727)	8.03 (409)	2.94 (226)

The changes overtime are presented in a graph below.

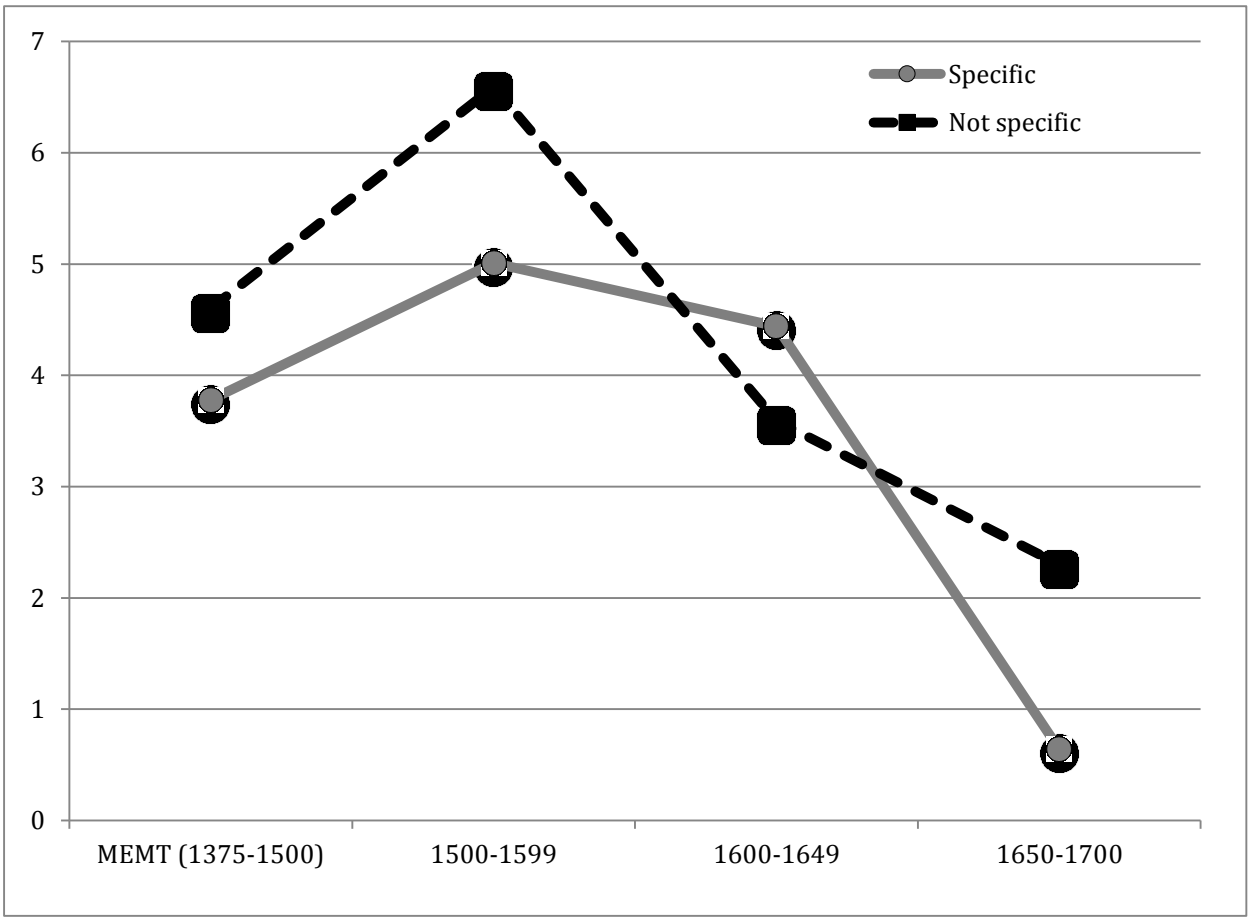


Figure 7. Specificity of references by year group, N/10,000 words

Although texts written in the 16th century have clearly more not specific references than specific ones and the first half of the 17th century has a slightly higher frequency of specific references, the frequencies of specific and not specific references are relatively close in the first three year groups. In the latter half of the 17th century, however, the difference is more pronounced and specific references are a lot less frequent than in the other year groups. References to specific texts of ancient authorities were part of the style of traditional learned medical writing and they clearly became less common towards the end of the 17th century when new styles of medical writing challenged traditional learned medicine (Wear 2000:305-306; see 3.2. above).

6.3.3. Authorities by year group

The references to the three authorities are very similar in terms of specificity in each year group, but there are some interesting differences in the number and tone of references. Overall, references to Galen are the most frequent in all year groups:

Table 12. References by name and year group, N/10,000 words (raw figures

Year group	***Avicenna***	***Galen***	***Hippocrates***
MEMT (1375-1500)	2.21 (104)	4.62 (218)	1.55 (73)
1500-1599	2.28 (143)	7.57 (475)	1.74 (109)
1600-1649	1.41 (72)	3.96 (202)	2.65 (135)
1650-1700	0.23 (18)	1.82 (140)	0.88 (68)

However, whereas references to Avicenna and Galen decline after a peak in the 16th century, references to Hippocrates are the most frequent in the first half of the 17th century. Furthermore, the references to Hippocrates in this year group are also more affirming than references to Galen:

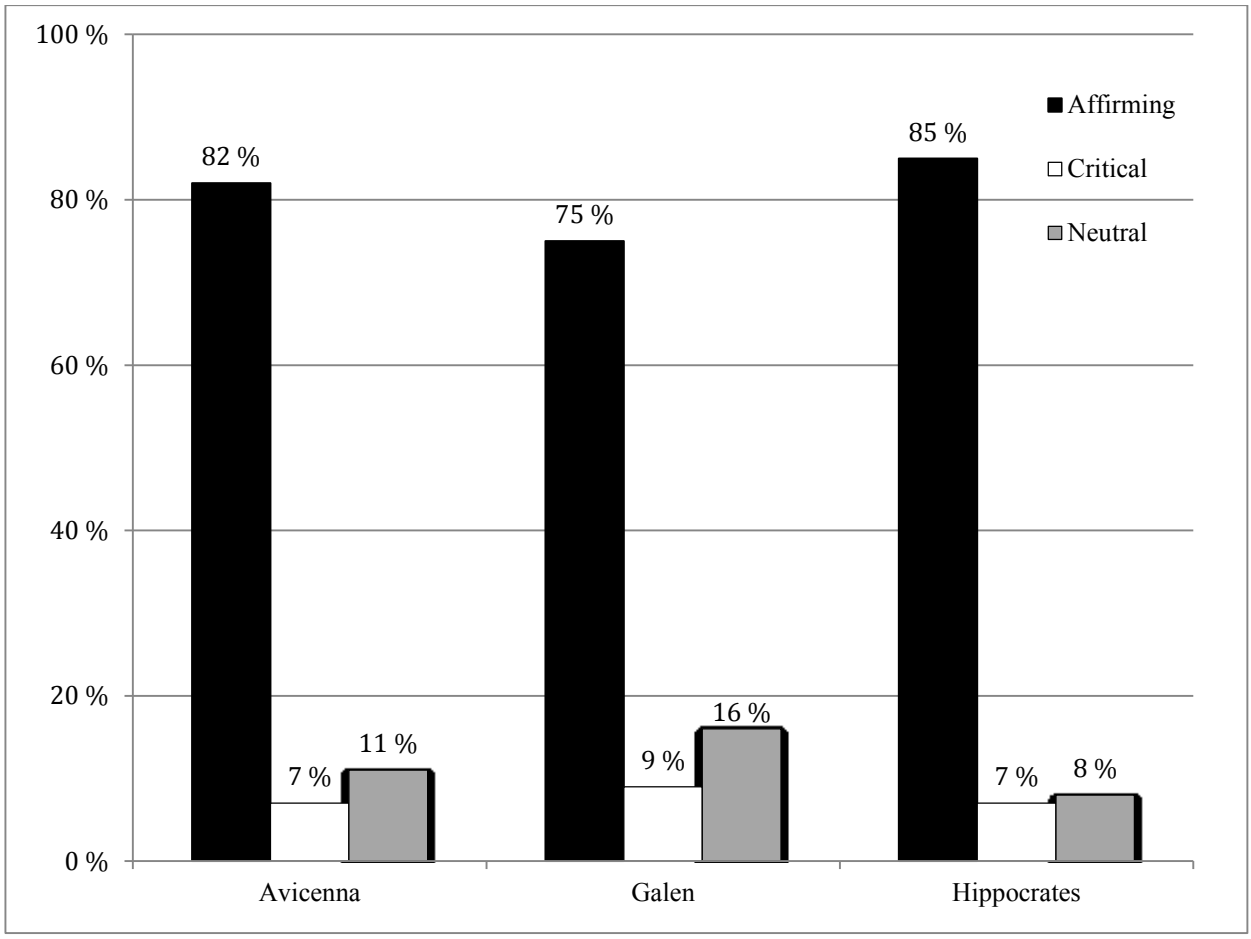


Figure 8. References in year group 1600-1649 by name and tone (percentages)

Galen is also criticised more often than Hippocrates or Avicenna. There were medical practitioners in the early modern period who called Hippocrates the first true empiric, and they criticised Galen for lack of originality and for relying too much on Hippocrates' work (Wear 2000:76). According to them medicine became stagnated because later writers emulated Galen rather than Hippocrates, who had done original research and reported his own observations instead of commenting on the works of others (*ibid*.; see section 2.2 above). This might explain why references to Hippocrates are the most frequent in the first half of the 17th century and why references to Galen are more critical in this group than references to Avicenna or Hippocrates.

7. Discussion

Previous studies on references have included a wider range of references from ancient Greek authorities to medieval authors and general groups of people (see 3.3. above). In focusing on just three specific names and analysing the references to them in more detail in terms of tone and specificity my aim has been to create a more in-depth picture of the use of references in early English medical writing. As noted by Taavitsainen (2009), references to ancient authorities became increasingly rare towards the end of the early modern period. The frequency of critical references increased slightly after the year 1599, but it would seem that overall when the attitudes towards these authorities changed they were dropped completely rather than criticised.

By focusing on a small set of references I was also able to analyse the instances in more detail within their context, which is desirable when approaching language variation and change from the framework of historical pragmatics and discourse analysis. Furthermore, MEMT and EMEMT are specialised on one specific variety of language, which makes them well-suited for discourse analysis. Although due to time restrictions I was not able read each text from the beginning to the end, familiarising myself with the immediate context in which the reference occurred enabled to me to determine whether the reference was likely to be affirming, critical, or neutral. When analysing the references in addition to the folio or page in which the reference appeared I read two preceding and two succeeding pages, which helped me to determine what the discussion was about and what the author's stance was. There are, however, likely to be cases where reading the whole text would have changed my analysis. Assessing the specificity of references within my parameters was a more straightforward matter, but it is possible that there are cases where the specificity of a reference did not became apparent within the immediate context.

There are also potential problems with my approach, as examining just three names offers a rather narrow view of all possible references. In addition to the groups listed above, there can also be references to titles of specific texts without the name of the author, which fall outside

the scope of this study. Therefore my analysis of the specificity of references is not entirely comprehensive. However, the glimpses into the specificity of references offered by my study give new information on how registers of medical writing differed from each other. The results suggest that specific references were especially linked to more theoretical discussions and the grey areas of medical knowledge, and therefore they were more frequent in theoretically advanced texts. As features of scholastic medical writing specific references were not, however, part of the theoretical discussions found in *Philosophical Transactions*.

According to Taavitsainen and Pahta (1998) the use of references was determined by the register of medical writing, and learned medieval texts based on the Latin tradition tended to have the highest frequency of references to authorities, which corresponds to my results to some extent. Affirming references were overall frequent in all categories of the MEMT, but surgical texts had clearly the highest frequency with 20.8. On the other hand, remedy books and verse do not differ much from specialised texts in frequency or tone. It would seem therefore that references to authorities were a frequent phenomenon in all categories of medieval medical writing. In terms of specificity, however, there is a clear division between the more learned end of medical writing and other branches of medical texts. While surgical and specialised texts both have specific references, all references in remedy books and verse are not specific.

Taavitsainen (2009) suggests that during the early modern period the relationship between learned and popular texts changed, as the frequency of references declined in all categories expect regimens and health guides, which made more references in the second than the first half of the 17th century. Taavitsainen argues that this was because references gained a new function in some genres of medical writing, which was adding an aura of learnedness to texts (2009:50). The results of my study support this, as regimens and health guides are among the most conservative categories of the EMEMT in terms of tone, and have the highest frequency of references overall. In

addition to regimens and health guides this function also seems to be common in surgical treatises.

8. Conclusion

References to authorities dropped dramatically after the year 1599, and only critical references increased, but the change was very slight. During the 16th century, however, medieval patterns of tone and specificity continued and the frequency of references increased slightly before the drop at the end of the century, which can be explained by the renaissance humanists' interest in ancient Greek sources of knowledge and their desire to reconstruct it without medieval interference (Siraisi 2010:73-74). After the drop of the year 1599 specific references became increasingly rare, and by the end of the 17th century their frequency had dropped from the 6.59 peak of the 16th century to 0.64.

Affirming references were common in all categories of the MEMT, and specific references appeared only in connection with learned medieval texts. In the early modern period, however, the categories were more varied, which hints at a diachronic change within the traditions of medical writing. The general trend of tone continued to be *affirming* > *neutral* > *critical* with the exception of texts on midwifery and *Philosophical Transactions*. Midwifery texts represented a mixture of traditional learned medicine and innovative work inspired by the advancement of anatomical knowledge in the 16th century. The scientific articles of *Philosophical Transactions* on the other hand were the top-level of scientific discourse in 17th England and therefore the features of scholastic medical writing had little influence on them.

With the exception of the scientific journal theoretically advanced texts tended to be more specific than texts that dealt with general knowledge. Plague treatises had an especially high frequency of specific references, which is most likely because they tried to find explanations for the epidemic in the writings of the authorities. Specific references also seem to have been especially connected to traditional scholastic writing, as less conservative genres tended to have fewer specific

references. Furthermore, texts that aimed to appear learned, such as surgical treatises and health guides, have a relatively high frequency of specific references.

The present study has mapped the use of references to scholastic authorities in new ways and identified various aspects that can have an effect on the tone and specificity of references. Applying a similar kind of approach to other kinds of references could clarify further the practice of referencing in the history of early English medical writing. For instance, the study of references to general groups of people might yield more instances of critical references, as being critical about a more vaguely defined group might have a lower threshold than explicitly naming someone. Furthermore, studying the tone and specificity references to contemporary authors might give new insights into the intertextual connections between vernacular medical texts as well as between English and Latin medical texts. All in all, the use of references in early English medical writing demonstrates that ideological changes in scientific fields have a fundamental effect on the stylistic choices of scientific texts.

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